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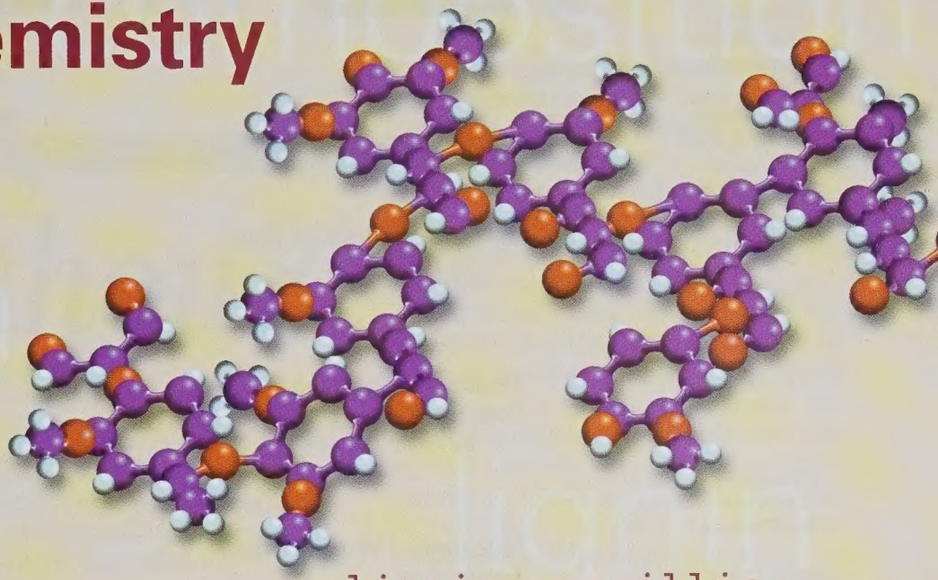
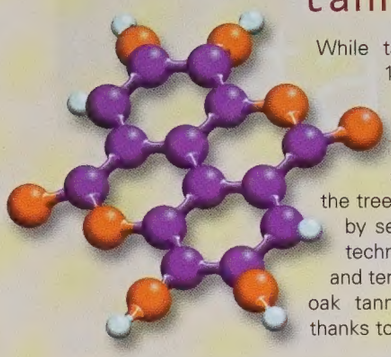


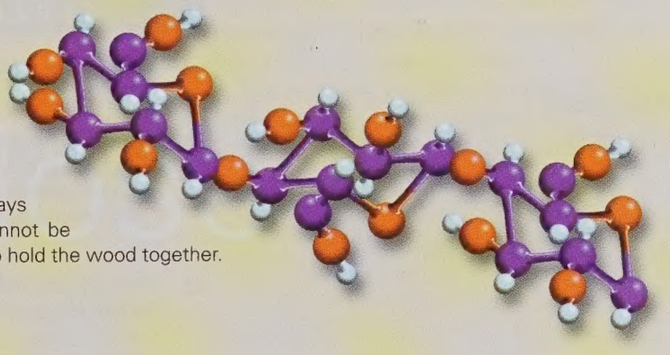
lignin → vanillin

A family of compounds, notably vanillin, is released during oak lignin breakdown. Slowly, nature's elements including precipitation, ultraviolet rays, and fungi break down lignin while toasting accelerates the degradation. Scientific understanding of these processes allows for more precise flavors.



tannin

While tannins are approximately 1% of American oak and 8% of French oak mass, they play a vital role in aging. Hydrolysable, heat sensitive tannins stored in the tree's radial rays are controlled by seasoning regimes, bending techniques, plus toasting times and temperatures. Today, precise oak tannin levels are achievable thanks to science.



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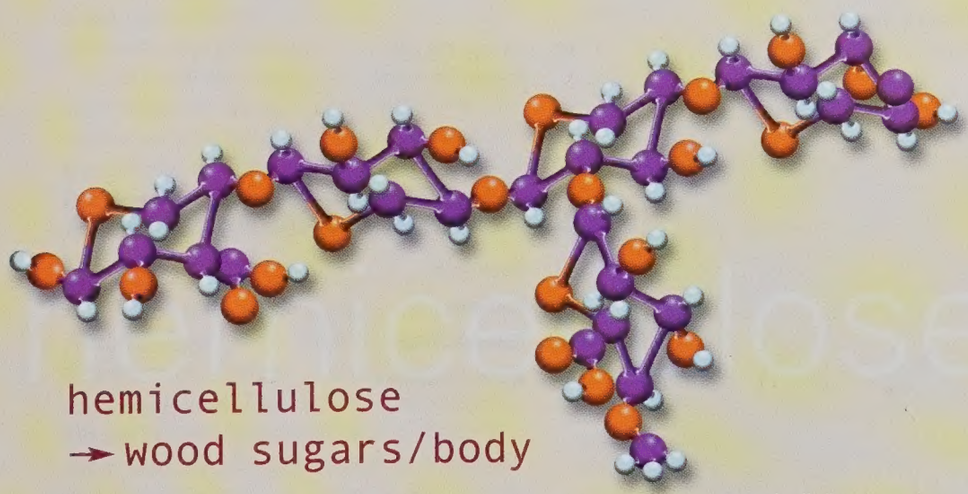

hemicellulose → wood sugars/body

Air seasoning initiates the polymer's break down into simple sugars. As oak climbs through 300°F during toasting, more simple sugars form, then caramelized sugars and sweet-associated aromas develop. Toasty characters develop as the oak passes 420°F. Embracing this research, controlling temperature over time allows definable, repeatable flavors.

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Cover photo: GK Machine's Vineyard Tracker in Robert Mondavi Vineyards, Oakville, CA. Photo by Fred Lyon

"To stimulate continuing improvement in the wine industry."

Oh Terroir, where art thou?

BY Peter Bell
Fox Run Vineyards
Penn Yan, NY

Sitting in church last Sunday, I was engaging in a little creative mind-wandering, as is my habit whenever I find myself in a pew.

As our congregation's resident agnostic, I feel entitled to a certain lack of attentiveness, especially when it comes to listening to all those disquieting accounts of the Israelites trying to cope with the vengeful and capricious God of the Old Testament.

This publication is not the appropriate forum for discussing intensity of religious belief, or lack thereof. But the notion of agnosticism may in fact have some application to the world of wine.

Let me elaborate. I'm not proposing to challenge whether wine does — or does not — exist. We'll leave that to the professional philosophers.

Let's say we start with the assumption that the thing I turn grapes into, and that you and I drink, has enough tangibility to allow us to get it from the bottle into the glass and thence to our mouths and, ultimately, blood streams.

Peter Bell has a B.A. degree in Anthropology from Trent University in Peterborough, Ontario, Canada, and a B.S. in Enology from Charles Sturt University in Wagga Wagga, New South Wales, Australia. After working as a winemaker in Australia and New Zealand, he came to the Finger Lakes region of New York in 1990 and has been winemaker at Fox Run Vineyards on Seneca Lake since 1995. Peter is also an adjunct lecturer in the Department of Food Science at Cornell University and consults to a number of wineries in the eastern U.S.

What I want to focus on is one of those fuzzy, attractive concepts that are being batted around a lot these days among people who talk to excess about wine instead of just drinking it. The topic: *terroir*.

Most wine geeks know that *terroir* is a French concept — far more than just a term — without a real English-language equivalent. A person whose job it is to wrestle with semantics might define *terroir* as "the totality of soil, topography, temperature, rainfall, and hydrological influences, especially as they relate to wine quality."

Some clever English speaker, making use of our language's ardent love of neologism, recently condensed this clumsy bunch of words into the single term "somewhereness," which I think is a very fetching way of describing something that is essentially foreign to our minds.

No one talks about *terroir* more than the French, of course. To their way of thinking, *terroir* is that to which all notions of a wine's uniqueness can be traced.

A first-growth Claret will always be superior to wine from the lesser-ranked property a few hundred meters up the road because the site on which its grapes are grown has long been accepted as superior. The distinct tannin structure of a Côte d'Or Pinot Noir owes its unique mouthfeel to the distinguished provenance of the grapes from which it was made. And so on.

Overall, *terroir* has had less success as an export commodity than other quintessential French inventions, such as croissants or lingerie or Brigitte Bardot.

Nevertheless, an increasing number of California winemakers and grape growers have added the word to their lexicons, and are making bold attempts to discover their inner *terroirs*. The more vocal of them have even banded together to call themselves *Terroirists*, a nice reference both to their favorite topic and the enthusiasm with which they spread the gospel.

Now, I would be one of the first to attest that the site on which grapes are grown has an enormous influence on the qualities of a finished wine.

Challenge that assumption by planting some Pinot Noir grapes in a patch of heavy clay soil, or on a slope that gets too much icy air, and the wines from those grapes will never rise beyond the pale and vapid. And conversely, it should be clear to everyone by now that the great wines of the world *always* arise from great sites.

But in my experience, a lot of so-called *terroir* effect has to do simply with variations in soil fertility and winemaking practices. Many "single-vineyard" wines I have tasted are indeed unique, but only in the *worst* sense of the word. That unique character can, alas, be traced to low-to-moderate levels of what should be recognized as winemaking defects.

I once spent an afternoon tasting the vineyard-designated Cabernet Sauvignon and Zinfandel bottlings of a well-known, high-end California producer. Each wine was indeed different, and the idea that these differences were directly traceable to *terroir* was seductive.

But I came to the conclusion that while site did indeed influence the final wine quality, things weren't quite as neat and tidy as the *Terroirists* would have us believe. One wine had a trace of earthiness, another had a distinct barnyard aroma, and a third had the telltale sharpness in the mouth of too much acetic acid.

All the individual parcels of grapes were presumably treated in essentially the same way. So where did they acquire their dubious unique personalities?

One explanation lies in the nutritional limitations of the soil itself. For instance, certain sites have low soil levels of nitrogen. The juice of grapes from these sites will also be low in nitrogen, which happens to be one of the essential nutrients for yeast growth.

Too little nitrogen during fermentation, and a minute amount of hydrogen sulphide is produced by the stressed-out yeast cells. The finished

wine often ends up smelling vaguely of earth, beef, or coffee. A simple leap of faith is all it takes to believe that this wine is "expressing its *terroir*."

It's not just soil composition that can cause a wine to veer alarmingly towards unpalatability. *Brettanomyces*, an insidious spoilage yeast that affects red wines the world over, has only recently been recognized for what it is — a microorganism which more or less diminishes wine quality.

The particular aromas associated with a wine tainted with "Brett" are customarily described as resembling horse sweat, the grosser corners of a barnyard, or a plastic hose.

Brett smells have nothing to do with *terroir*. Yet many decades of received wisdom, from before the days of crackerjack wine microbiologists, have convinced a large number of people that these very same smells are a sure indicator of the wine's distinct geographical origin.

Once winemakers acknowledge defects such as these and take steps to eliminate them — as more and more of them are learning to do — then the *terroir* distinction is often dramatically less evident.

When grapes from a certain site are low in nitrogen, then supplemental nitrogen, used the world over, allows the yeast cells to convert sugar to alcohol cleanly and happily. *Voila!* No earthy or beefy smells. But *merde alors!* What has happened to the expression of *terroir*?

This process can work in reverse, too. Suppose you, as a winemaker, have left your Cabernet Sauvignon in oak a little too long, and it now smells like wood-chip tea. What to do? *Pas de problème*: allow it to develop a Brett infection. Suddenly the oak no longer smells like it is "planted" on the wine, and yes, your Cabernet Sauvignon smells and tastes astonishingly like a classified growth Bordeaux.

Any competent New World winemaker wishing to pay lip service to the motherland can dial up the "French" character of his or her Cabernet Sauvignon simply by letting the wine get a little Bretty.

Or suppose you are a Bordeaux winemaker with a penchant for mischief. Take your Cabernet Sauvignon and Merlot grapes and make them into wine, only this time keep the wine from developing a Brett infection by careful attention to cellar hygiene. Uh-oh ... this wine smells and tastes exuberantly fruity, like some inferior New World product. No *terroir* can be detected.

Sounds like an outrageous thing to do, right? And yet some wine writers these days complain that one of the great tragedies of modern winemaking is that *terroir* effects have become blurred. They state that modern, technology-based winemaking, carried out by worldly and highly-trained practitioners, is resulting in a tsunami of

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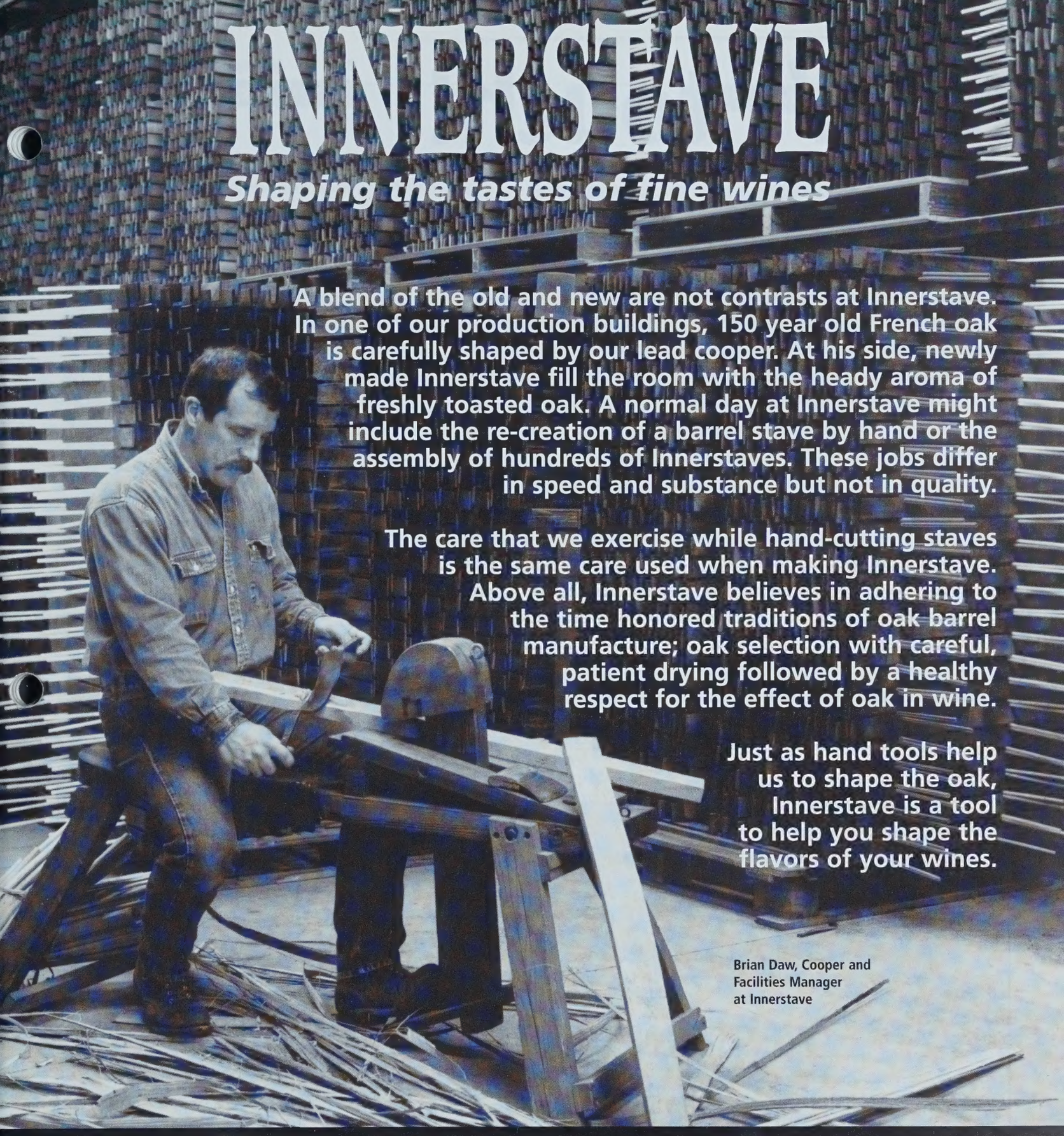

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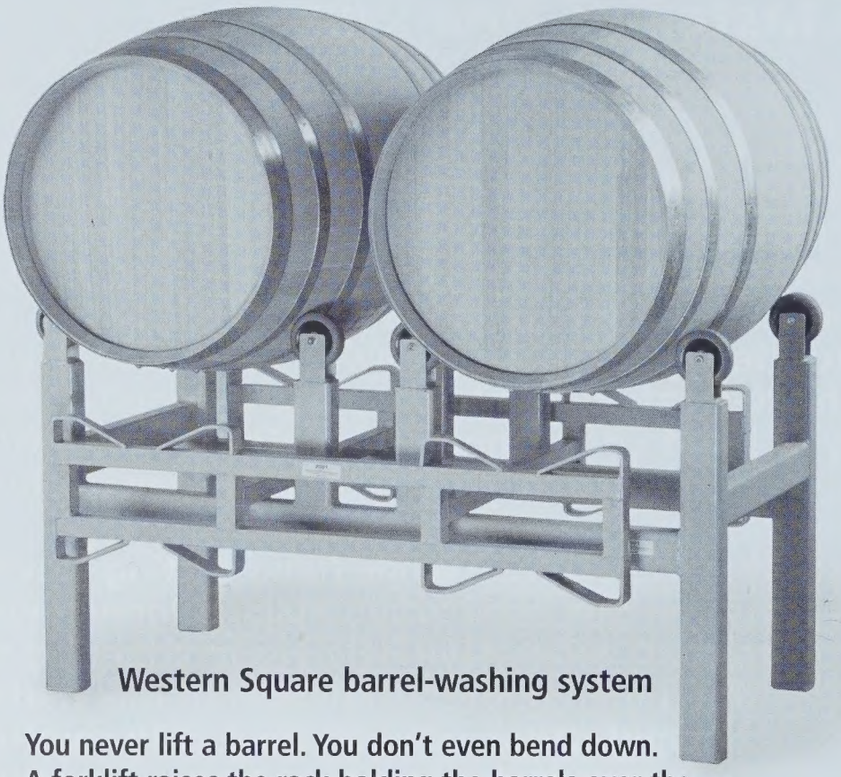

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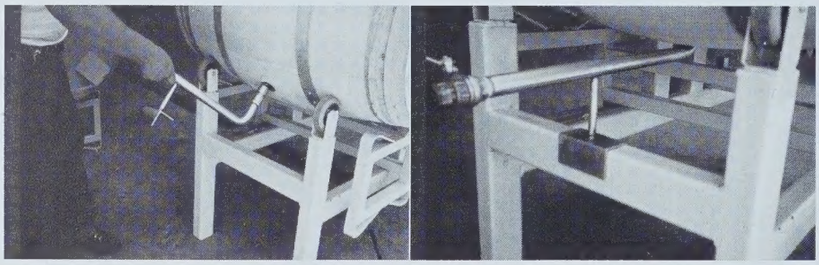

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clean, fruit-driven wines utterly lacking in a distinctive personality.

What wine writers are really saying, without knowing it, is that there is a dramatic increase in the number of well-made wines on the market. We have never been so fortunate.

I have tasted red wines in Bordeaux, made by less tradition-bound winemakers who took great care of their wines as a matter of course. Cellar hygiene, far from being some New World neurosis, is a priority for them, as is a deep acquaintance with microbiology and chemistry. Certainly their wines did not resemble classic Bordeaux. But ironically enough, with the spoilage characters absent, the wines were intense, fresh, and delicious, and they even expressed some stamp of the soil from which they arose.

So, I'll concede that *terroir* actually exists, and it isn't just another concept for me to be agnostic about on Sunday mornings. But I propose that some of the mysticism that surrounds *terroir* be swept away.

Is *terroir* – that ineffable combination of geology and geography and history and so many other things – really the ultimate predictor of wine quality and uniqueness? Probably not.

But I've already said I think it exists, so, with a hearty dose of the skepticism that got me started on this whole discussion, I'll propose a new and refined definition of the term.

Terroir, in my religion, is a piece of somewhereness. Standing on it is a winemaker who respects the old and the new, who knows that the marriage of the qualities that make the traditionally great wines what they are, with what we now know about clean winemaking is a marriage made — well, I'll maybe even go so far as to say it's a marriage made in heaven. ■

Author's Note: *This text was originally written for a general consumer audience. Text was published in Wine East, July/August 2001, and has been edited by* ***PWV*** *and author.*

Editor's note: ***PWV*** *welcomes responses and reflections on the topic of terroir and other subjects of interest to* ***PWV*** *readers. Write a Letter to the Editor or contact the Editor via phone (415/479-5819)*

Keeping wine on the Congressional agenda

BY Millie Howie

Mike Thompson (D-CA) was elected to the House of Representatives from California's First District in 1998, representing the major premium winegrape-growing area in the state (including the North Coast counties of Napa, Lake, Mendocino, and the northern portion of Sonoma). After Thompson took office, he met with Representative George Radanovich (R-CA), whose district includes the wine-rich Sierra Foothills.

The two discussed the need to provide their fellow representatives and senators with accurate information about the importance of the wine industry to the national economy and the need to keep the wine industry informed about wine-related developments at the federal level. Thompson was chair of the Senate Select Committee on California's Wine Industry while in the California legislature, and he and Radanovich decided to form a comparable entity in Congress.

The resulting Congressional Wine Caucus (CWC) is an informal, bipartisan and bicameral Congressional membership organization. Thompson and Radanovich act as co-chairs. But the CWC has no other officers or by-laws and holds no official meetings. Tricia Geringer, legislative director for Radanovich, and Tom LaFaille, Thompson's administrative assistant, coordinate the efforts. The Caucus was created through the simple act of registering with and receiving recognition from the House Administrative Committee.

In March 2000, each member of Congress received an invitation to participate in the CWC. The invitation noted that wine grapes are the largest fruit crop in the nation and the sixth largest crop overall, and that the wine industry contributes over $45 billion to the national economy creating 556,000 jobs, accounting for $12.8 billion in wages and $3.3 billion in state and local tax revenues alone.

A reception and wine tasting were held in May 2000, honoring the charter members of the Caucus. There are now 163 members representing 44 states. (Forty-nine of the 50 states enjoy wine production within their borders. The sole exception is North Dakota, though two members of that state's congressional delegation of three are CWC-members.)

To broaden their colleagues' knowledge of wine, CWC, in partnership with the American Vintners Association (AVA) and the Wine Institute, hosts events in the House office building every six weeks or so to which all Caucus members are invited.

Many of the events are receptions and wine tastings presented by state grape commissions or other wine entities, such as Zinfandel Advocates and Producers (ZAP), Napa Valley Vintners, Sonoma County Wineries Association, Women for Wine Sense, or California Association of Winegrape Growers (CAWG).

The value of these events to winegrape growers group is emphasized by comments from Steve Burns, executive director of the Washington Wine Commission. "When we conducted a tasting for the full congressional caucus as part of our Taste Washington USA road show, we had 50 wineries participating. We flew in Seattle chefs to prepare regional dishes. The one-on-one contact in this social setting with the senators and representatives at the tasting made it easier to follow up in political meetings with our legislators the next day."

"When we hear that a winery group is coming to Washington DC on a marketing tour," says Simon Siegl, executive director of the AVA, "we make every effort to set up a reception for members of the CWC to help familiarize them with the size and scope of the industry."

Many Caucus members have long histories of support for the winegrape-growing and wine-producing industries. Donniella Winchell, executive director Ohio Wine Producers, points to three of her state's Wine Caucus members as exceptional examples of legislators dedicated to the betterment of the grape and wine industries.

Ohio's Senator George Voinovich (R), former governor of the state, continues on the national level programs he initiated in his home state, including creating opportunities for the industry to showcase its products, establishing investment credit programs to expand winegrape acreage, and increasing actual dollar funding for research and marketing.

The newest Ohio representative in CWC is Paul Gilmor (R), whose history of involvement in the state's wine industry dates back to the 1980s when he sponsored the first "Ohio Wine Week" promotional event. As a Caucus member, he provides industry representatives with the opportunity to speak one on one with him and his colleagues on matters of legislative importance and support.

At CWC meetings stressing education, guest experts present overviews of various problems facing the industry.

In the past year, issues that the Caucus co-chairs have carried to the membership on behalf of the industry have included comments to the ATF opposing expansion of the government warning statement on wine labels; support for continued and increased research funding for the Viticultural Consortium; funding support for Pierce's disease research, and the glassy-winged sharpshooter containment and control program; comments to the U.S. Department of Agriculture (USDA) in support of wineries' ability to label wine as "organically grown;" support for export promotion funds through the USDA's Market Access Program; and explanations of the complexities of and support for reasonable direct shipment laws.

A number of communication avenues are used to get the word out to Caucus members, reports Tom LaFaille. "We send out 'Dear Colleague' letters signed by both chairs, we contact staff in members' offices

by e-mail, and we inform other interested parties through associations such as AVA and the Wine Institute. The best contacts are personal conversations between an industry mamber and his or her representatives at wine tasting and educational events."

One of the most high-profile CWC activities has been sponsorship of "A Vintage Affair," held in May 2001. This two-day celebration of exceptional wines and extraordinary cuisine began with two spectacular winemaker dinners and concluded with a VIP reception, auction and banquet. Beneficiary of the event was the Children's National Medical Center (CNMC).

The 2001 "Vintage Affair" raised over $400,000 and was attended by 350 CNMC supporters, members of Congress, and wine industry representatives. Requests for auction items were mailed in September (2001) announcing March 16 as the date for the 2002 event.

In speaking about this major charity event, Thompson and Radanovich expressed their thanks to the wine industry for its support and explained that "A Vintage Affair benefits the American wine industry and the CWC by raising wine's profile in the nation's capitol. Additionally, supporting a major, recognized institution such as the CNMC is an excellent way to highlight the wine industry's impressive record of generosity and philanthropy in the community."

Just before Congress adjourned for its summer 2001 recess, Representatives Thompson and Radanovich circulated a letter to Caucus members asking for support in opposition to the proposed changes to the warning label regulation on alcohol containers (ATF Notice #917). The letter was submitted with 16 signatures, and similar letters are being drafted by Representative Walter Jones (R-NC), and Senators Barbara Boxer (D-CA) and John Edwards (D-NC).

Representative Lynn Woolsey (D-CA), whose district includes a good portion of California's premium grapegrowing region, believes the current warning labels on alcoholic beverages are effective and clear. "That's why I recently joined my colleagues in a letter to Bradley A. Buckless, the director of the BATF strongly opposing this new regulative proposal."

Appreciation for CWC activities is frequently voiced, in person or by e-mail. California growers, through CAWG, consider the Caucus the most effective forum of its sort for creating discussion and action on such high profile problems as the threat of depredation of vineyards by the glassy-winged sharpshooter, and for providing an important informational network for action plans which lead to solutions.

"Definitely," states Karen Ross, CAWG president, "with the Caucus in place, the wine community has avenues open to obtain assistance on many of the issues facing it today — and those that may arise in the future." ■

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2002 UNIFIED WINE & GRAPE SYMPOSIUM

Helping America's vintners and winegrape growers meet the multiple challenges of an increasingly global industry will be one of the main themes of the 2002 Unified Wine & Grape Symposium to be held at the Sacramento Convention Center in Sacramento, CA, January 29–31.

The symposium has tapped experts both within and outside the wine and grape industry to provide insights, data, news, and perspectives essential to good business decisions.

"The program will take full advantage of the three-day format started in January 2001," says Patrick Gleeson, symposium program chair. "Program sessions for the opening day will highlight the importance of better understanding the multi-faceted interactions of the wine and grape community. All facets of the community are intimately linked, and we can't lose sight of that if we are committed to expanding the consumer base."

Program notes

Bill Turrentine (Turrentine Wine Brokerage) will give the first presentation on Tuesday: "Positioning the Wine Community in a Changing World Market."

Willard Bishop, head of Willard Bishop Consulting Ltd, Chicago, IL, will present the keynote address, "Challenges and Opportunities in Different Retail Outlets." He will offer insight into America's grocery chains, tapping his extensive experience with retailers such as Albertsons, Kroger, and Safeway. His knowledge of associations, such as the American Wholesale Marketers Association, Food Marketing Institute, and National Association of Convenience Stores, will also help attendees appreciate the influence of this market channel.

Bishop's presentation will set the tone for three days of seminars that examine marketing, sales, viticulture, enology, and business issues that will shape the future of the industry.

The general session on Wednesday will include an industry update on wine sales trends, winegrape and bulk wine supply by Barry Bedwell and Jon Fredrikson. Patrick Gleeson and Carole Meredith (UC Davis) will give an update on Pierce's disease biotechnology.

Thursday's general session will focus on "Insights into Globalization, Mergers, and Acquisitions," including discussion of major power shifts in the wine industry that concentrate the volume brands into fewer hands, the potential domination of the wine industry by spirits companies, and more concentrated power in a small number of large distribution companies.

Among numerous breakout sessions over the three days, Tim Hanni will moderate a panel discussion entitled: "Grapes to Glass: An Integrated View of the Wine-Food Chain." The panel includes Ron McManis, R.J.M. Enterprises; Andy Bledsoe, Robert Mondavi Winery; Chris Catterton, Bogle Vineyards; Doug Walker, Beringer Blass; Alan Dreeban, Block Distributing, Schertz, Texas; Ken Meiers, Meiers Wine Shop, Walton, Nebraska; and Gary Schwartz, P.F. Chang's (national Chinese bistro chain).

"Zinfandel: Cult or Culture?" will examine Zinfandel's booming popularity. Zinfandel is unique to California, and the diverse styles and price points being produced up and down the state exemplify its flexibility. A panel of vintners and growers will review this phenomenon.

Concurrent breakout sessions will include topics devoted to marketing, public relations, business and finance, enology, viticulture, and winery and vineyard safety (the latter offered in Spanish).

The "Minimizing Costs While Maximizing Resources" panel of Jeff Bitter, Carson Smith, Keith Patterson, and Hector Bedolla will address the issue of how to control costs without compromising quality and yield.

John Gillespie will be moderator of the "Reaching Beyond Current Consumer Boundaries" panel that will explore the question of whether program and marketing decisions are more cost-driven or consumer-driven. The session will highlight companies that are targeting and implementing challenging programs to meet consumer needs.

A "Branding through AVAs" panel will analyze the value of American Viticultural Areas (AVAs) and look at

who gains what in development and promotion of appellations. Panel members are: Jim Lapsley, Jerry Lohr, Nick Frey, and Steve Burns.

The Bureau of Alcohol, Tobacco & Firearms is considering a variety of regulation changes that could impact wine label language, how it is displayed, and the methods in which Certificate of Label Applications (COLAs) are processed. The panel of Tom Stewart (ATF), Simon Siegl, and Wendell Lee will offer wineries the most accurate information on COLA developments and how to be most efficient in this critical area of compliance.

The laws of supply and demand coupled with the fact that wine is an agricultural product ensure that this industry will experience unpredictable, inevitable cycles. The "Economics of Surviving Unpredictable Business Cycles" will be reviewed by a panel of Jim Verhey, Mike Fisher, Vernon Crowder, Fred Lagomarsino, Michael Mendes, and Rich Smith.

"Incorporating Agricultural Land Preservation Tools into Business Plans" is the topic for the panel of Randy Lange, Eric Vink, Rob Deford, and Holly King who have a long-term commitment to ag land preservation. What are the implications for the lender, the neighbor, and the flexibility for business decisions in the future?

"Handing Down the Family Farm and Winery to the Next Generation" will be presented by Roger Bowley and Donald Jonovic. This session will outline a value-management process that includes regularly defining and reviewing owner objectives; developing the ability to see and respond to distant threats; and steps family business owners can take to ensure that problem-solving begins early and is relentlessly pursued.

Another business-related session is: "Distribution for Tomorrow — Securing Your Fair Share of Attention Today!"

Enology sessions will include "Assuring Wine Quality During Shipment and Storage," which will examine commercial shipping conditions, packaging, and monitoring options once wine has left the producer. The sensory implications of shipment and storage will be highlighted by a tasting of wines stored under extreme circumstances.

"Ozone in the Winery — Applications, Efficacy and Safety" will be the subject of a panel reviewing increasingly popular ozone generators, with discussion of sanitation techniques and issues ranging from effective barrel to bottling line treatments, energy considerations, and health concerns for cellar workers. Panel members are Brian Parker, Paul Nevosh, Tom D'Avico, Karen Ernsberger.

A session on "Blending of Marketing and Winemaking: The Art of

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Constructive Negotiation" will examine the conflict that marketing and production staffs frequently experience over control of winemaking style and packaging decisions. The panel of Daniel Baron, Michael Smith, Randall Grahm, and Herbert Stone will offer suggestions on how to better equip both sides to resolve their differences constructively.

The "Blending for Balance — A Look at Alcohol Levels" panel of Gloria Mercado-Martin, Roger Boulton, and Monica Trinkle will complete the enology breakout sessions.

Viticulture sessions will be headed up by a topic that has received tremendous industry attention recently: Pierce's disease. "What Have We Learned from Temecula's Experience and the Kern County Pilot Project?" will address the threat of the glassy-winged sharpshooter (GWSS) and Pierce's disease (PD) interaction. A program update will outline progress that has been made in the GWSS/PD battle and will identify remaining issues needing to be addressed.

The panel of Jeff Dlott, Andy Hoxsey, Cliff Ohmart, and Karen Klonsky will explore "Integrated or Separate? Biodynamic, Sustainable, and Organic Farming Practices," providing commonalties and differences in the philosophies and strategies, and discuss available economic analyses of these approaches.

Bob Wample (CSU Fresno) will lead the viticulture session: "Viticulture Research Update: Grapevine Irrigation and Management."

A combined viticulture and enology session entitled "Are Today's Trellis and Rootstock Choices Meeting Expectations?" will discuss the explosion of knowledge of rootstocks and trellises over the past decade. Andy Walker (UC Davis) will lead a panel discussion of how trellis and rootstock choices have changed and which of these changes have improved quality and optimized production costs.

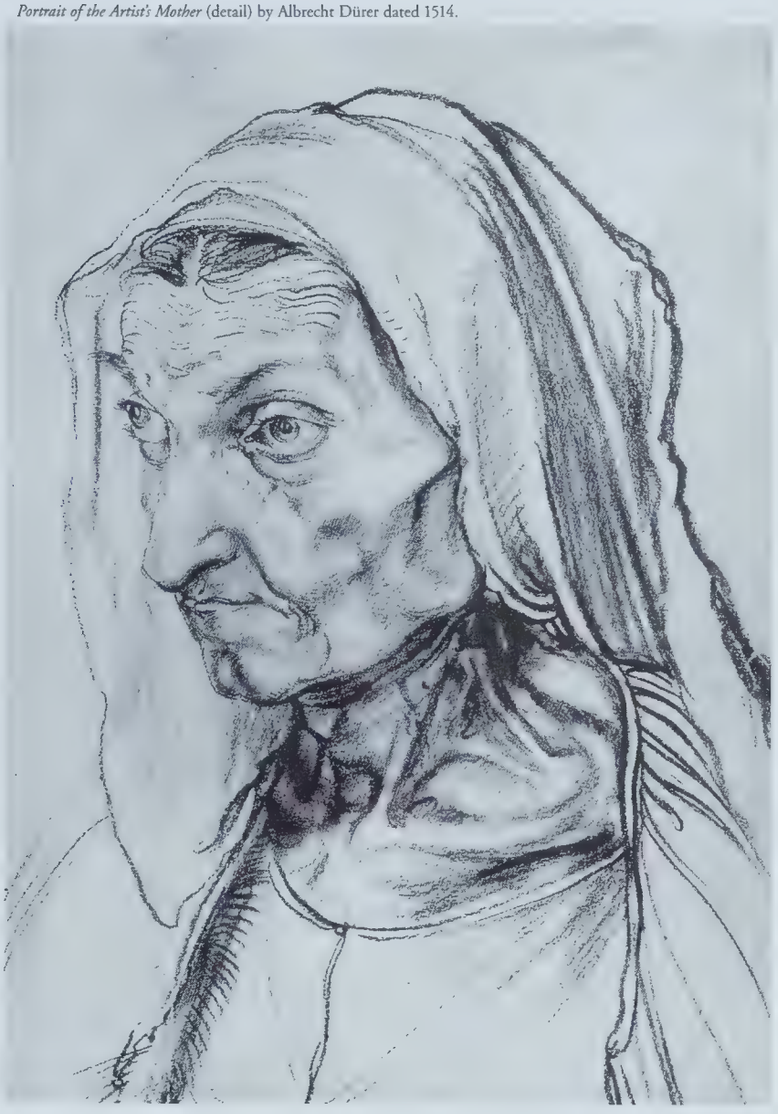
Exhibition of Equipment/Supplies

In addition to the full slate of technical and business sessions, the symposium's exhibit space will showcase equipment, supplies, and services to enhance and enrich America's wine and grape industry.

"Historically, our exhibit floor is very active," says Lyndie Boulton, executive director of the American Society for Enology & Viticulture, a co-sponsor of the Unified Symposium. "In January 2001, we expanded exhibit space to 200,000 square feet, and we've increased the exhibit floor a bit more, all of which has been sold out to more than 500 exhibitors for months."

To register or for more information, phone 916/340-1902 or visit the website at www.unifiedsymposium.org ■

Portrait of the Artist's Mother (detail) by Albrecht Dürer dated 1514.



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PRACTICAL WINERY & VINEYARD

WINE INDUSTRY SURVEY

Salaries on the rise

BY Amy Smith, CPA
Motta, Kryla, Fisher, LLP

Results of the seventh biannual *PWV* Salary Survey of California wineries* indicate that the compensation and benefits earned by wine industry employees in the state in 2000 and 2001 continued to rise, as they have for the past several years.

The average increase in compensation ranged from a low of 3% to a high of 16%, depending on job title.

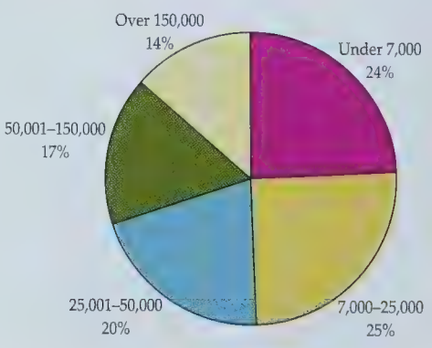
The *PWV* Salary Survey is a joint project of *PWV* and Motto Kryla & Fisher, LLP, wine business advisors. Survey questionnaires were mailed to California wineries in June 2001.

The questionnaire asked about salaries, bonuses, and benefits for 18 job titles, ranging from vineyard and winery workers to general managers and chief financial officers. Two items were added to the questionnaire relating to recruitment methods and personnel issues.

We believe that the anonymous responses to this salary survey provide results that are a reasonable indication of compensation and benefit trends for the California wine industry in general.

Sheila Ticen, of MKF, LLP, compiled results of 154 responses. These results are reported in five strata based on winery case production and range from under 7,000 cases per year to over 150,000 cases per year. Figure I summarizes the percentage of response by winery size. There is a fairly balanced distribution of responses across the size categories with the smallest

Figure 1:
Responses by winery capacity



* Only California wineries were surveyed, because economic factors are fairly congruent within the state. In general, California's cost of living and salaries average 128% of the national average, making comparison with wineries outside California difficult.

response from the largest wineries and 49% of the response from wineries under 25,000 cases.

Compensation

As in the previous two surveys, increases in compensation for most positions have exceeded inflation over the survey period. Figure II summarizes the average increases in compensation for selected wine industry positions from 2000 to 2001.

In comparison, the Consumer Price Index (CPI) for the western region, frequently used as an indicator of inflation, increased nearly 4% for the 12-month period ending July 2001. The Employment Costs Index (ECI), which measures changes in compensation costs, also increased nearly 4% from June 2000 to June 2001. The U.S. Department of Labor's Bureau of Labor Statistics publishes the CPI and the ECI.

Winemakers and vineyard managers saw a 5% to 8% compensation increase from 2000 to 2001. We did not find a significant correlation between their increases and winery case production.

Figure II: % Increase in average compensation

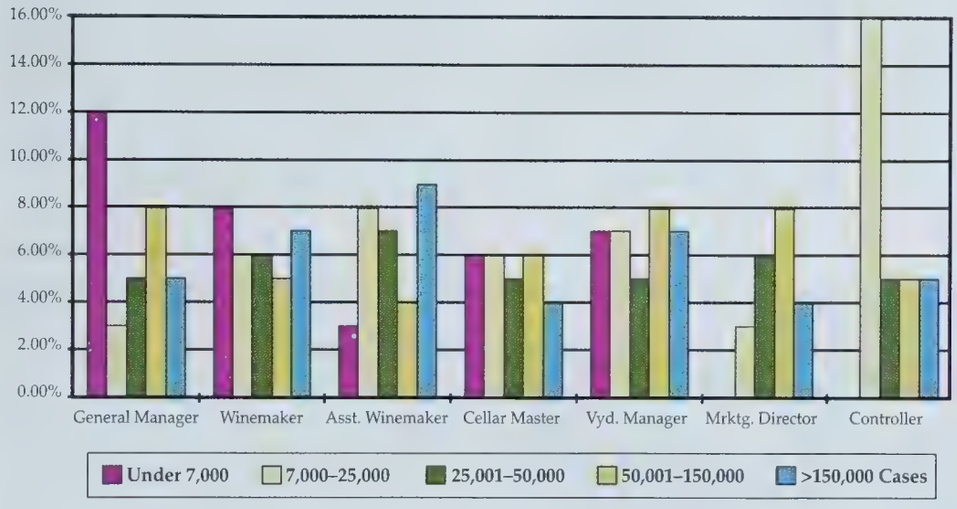
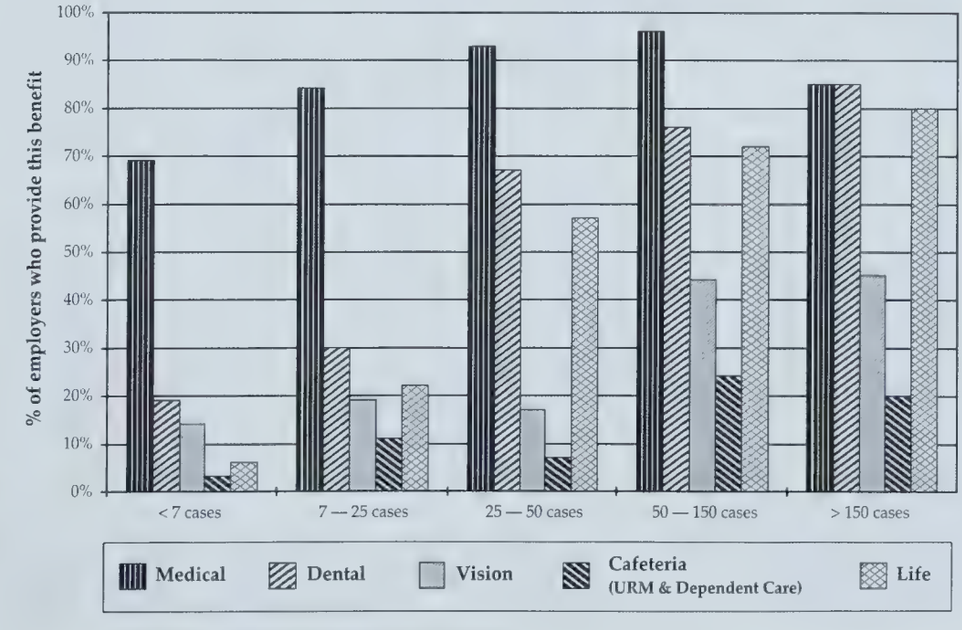


Figure III: Employee insurance benefits by winery size

Annual Case Production in 000s



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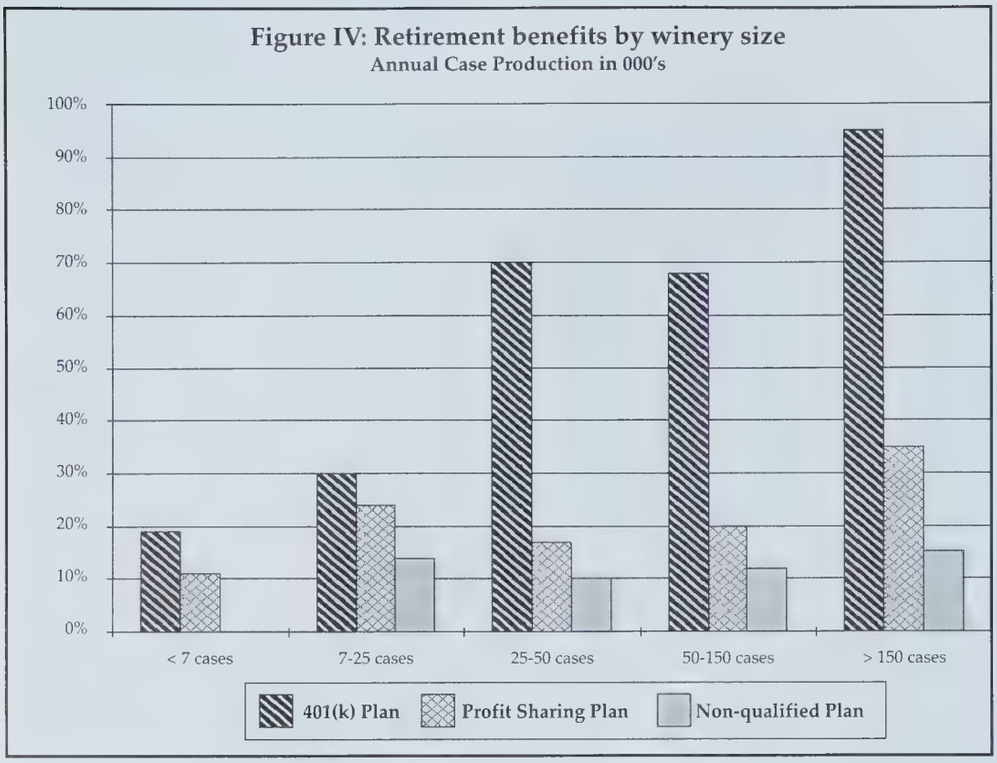

General managers' and controllers' compensation showed the greatest increases, but this was in smaller wineries. Controllers in 7,000- to 25,000-case wineries averaged a 16% compensation increase; their salaries in larger wineries remained flat. General managers saw a 12% average salary increase in wineries under 7,000 cases, while their increases ranged from 3% to 8% in larger wineries.

Employee benefits

More wine industry employers are providing a variety of benefits, including medical, dental, vision and life insurance, cafeteria plans, and free wine. In addition, employer-provided retirement plans, such as 401(k), profit-sharing, and non-qualified plans, are becoming more popular. Employee benefits provided by wineries directly correlate with winery case production, except for medical insurance.

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Medical insurance is the most common insurance benefit, provided by nearly 70% of wineries under 7,000 cases and by 95% of wineries of 50,000 to 150,000 cases. Dental insurance is the next most frequently offered insurance, ranging from just under 20% of the smallest wineries offering it to approximately 85% of the largest wineries doing so.

Life insurance is the third most popular insurance offering for larger wineries. Less than 20% of the wineries under 50,000 cases offer vision care, but more than 40% of those over 50,000 cases do. Cafeteria plan benefits lag behind the rest and are provided by only about 20% of wineries. Figure III summarizes the average insurance benefits that wineries provide.

Clearly, 401(k) plans are the most popular retirement benefit; they are provided by nearly 95% of the wineries over 150,000 cases. Less than 20% of the smallest wineries offer any kind of retirement plan at all. Profit-sharing plans are much less common, though they make a comparatively stronger showing in smaller wineries than in larger ones. Non-qualified plans are the least common retirement plan. Figure IV summarizes the average retirement benefits that wineries provide.

Recruitment methods and personnel concerns

This is the first time the survey asked respondents to provide information about recruitment methods and employment concerns. Recruitment methods polled included headhunters, newspaper advertisements, word of mouth, and other. Wine industry positions were divided into the following five groups: executives, department heads, administrative/clerical workers, winery workers, and vineyard workers.

The majority of winery executives are recruited through headhunters and word of mouth (Figure V). Administrative/clerical and department head employees are recruited mainly through advertisements and word of mouth. Most vineyard and winery workers are recruited through word of mouth and advertisements. Many respondents use the Internet as their "other" method of recruitment.

Figure V: Recruiting methods by position

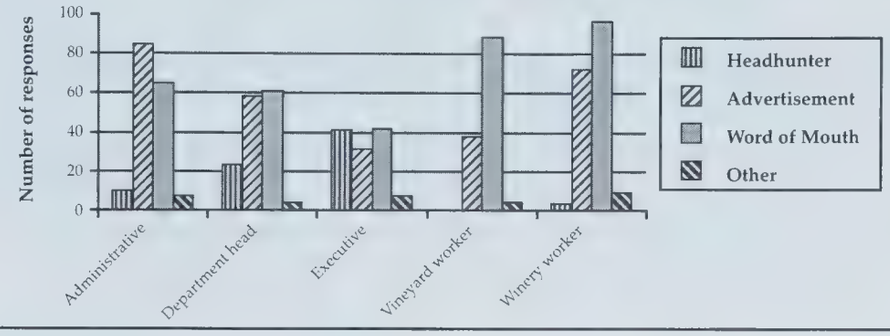
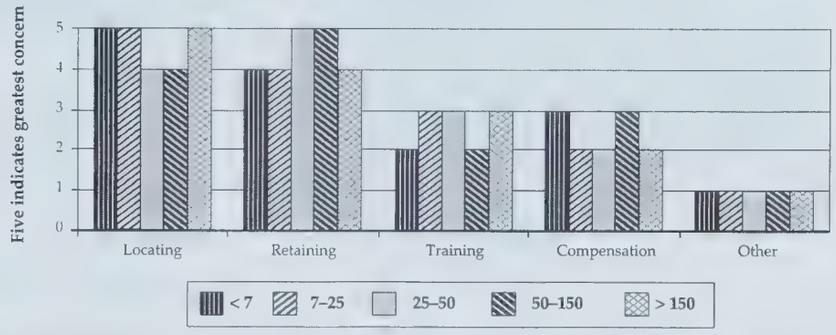


Figure VI: Employment concerns rated by winery size



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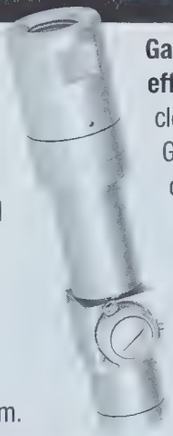

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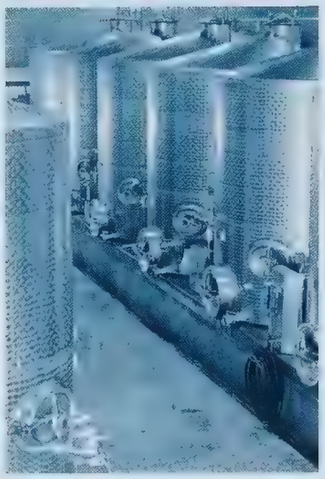

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Wineries were asked to rate their employment concerns on a scale of one to five, with five indicating their greatest concern. Figure VI shows that recruiting qualified applicants and retaining employees are the biggest problems. One factor making it difficult to recruit qualified applicants is California's high cost of living. Many wine industry employers find that they need to pay premium compensation and benefits to retain employees.

Conclusion

The California wine industry has experienced incredible growth in the last decade. The threat of Pierce's disease, replanting due to phylloxera, and the current economic downturn have not significantly impacted wine industry compensation and benefits. We expect the trend of increasing compensation to continue. ■

2001 SALARY SURVEY

GENERAL MANAGER

Winery Capacity: Under 7,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
1	$45,000 – $59,999
2	$60,000 – $79,999
2	$80,000 – $119,999
2	$120,000 – $160,000

Average=$96,714 Median=$102,500

Winery Capacity: 7,000 – 25,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
5	$32,000 – $49,999
4	$50,000 – $69,999
3	$70,000 – $99,999
3	$100,000 – $199,999
1	$200,000 – $250,000

Average=$88,075 Median=$141,186

Winery Capacity: 25,001 – 50,000 Cases/Year

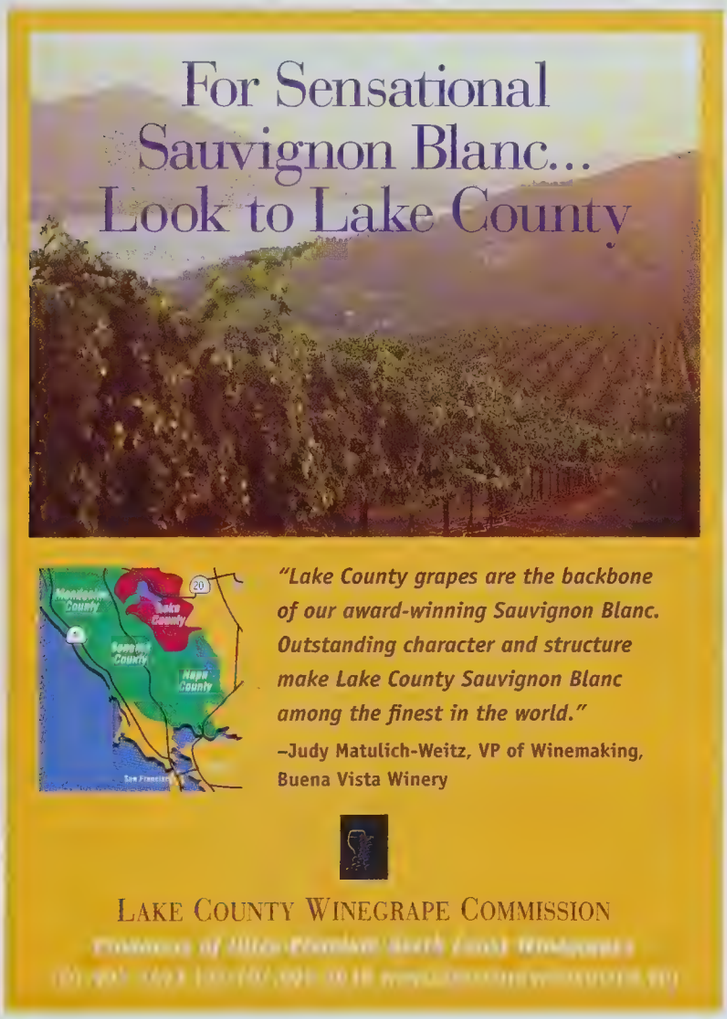
REPLIES	ANNUAL SALARY RANGE
4	$45,000 – $59,999
2	$60,000 – $99,999
2	$100,000 – $119,999
4	$120,000 – $129,999
4	$130,000 – $149,999
1	$150,000 – $179,999
1	$180,000 – $320,000

Average=$118,296 Median=$182,500

Winery Capacity: 50,001 – 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
3	$64,000 – $99,999
3	$100,000 – $119,999
2	$120,000 – $139,999
3	$140,000 – $159,999
3	$160,000 – $199,999
3	$200,000 – $287,500

Average=$151,491 Median=$175,095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SALARY SURVEY

Winery Capacity: Over 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
1	$112,000 – $129,999
2	$130,000 – $199,999
4	$200,000 – $299,999
1	$300,000 – $399,999
1	$400,000 – $520,000

Average=$240,598 Median=$316,250

WINEMAKER

Winery Capacity: Under 7,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
4	$30,000 – $39,999
5	$40,000 – $49,999
3	$50,000 – $59,999
1	$60,000 – $79,999
1	$80,000 – $100,000

Average=$49,518 Median=$65,000

Winery Capacity: 7,000 – 25,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
4	$24,000 – $39,999
7	$40,000 – $59,999
8	$60,000 – $79,999
5	$80,000 – $119,999
3	$120,000 – $160,000

Average=$70,119 Median=$92,000

Winery Capacity: 25,001 – 50,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
6	$40,000 – $59,999
9	$60,000 – $79,999
6	$80,000 – $99,999
3	$100,000 – $139,999
2	$140,000 – $161,000

Average=$80,806 Median=$103,000

Winery Capacity: 50,001 – 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
6	$53,000 – $79,999
7	$80,000 – $99,999
3	$100,000 – $129,999
5	$130,000 – $149,999
2	$150,000 – $208,000

Average=$104,939 Median=$130,793

Winery Capacity: Over 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
5	$84,000 – $99,999
2	$100,000 – $119,999
4	$120,000 – $139,999
3	$140,000 – $159,999
3	$160,000 – $199,999
2	$200,000 – $280,000

Average=$138,932 Median=$182,260

ASSISTANT WINEMAKER

Winery Capacity: Under 7,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
3	$23,000 – $29,999
5	$30,000 – $39,999
4	$40,000 – $52,000

Average=$36,990 Median=$37,500

Winery Capacity: 7,000 – 25,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
3	$22,000 – $39,999
7	$40,000 – $49,999
5	$50,000 – $78,000

Average=$47,681 Median=$50,000

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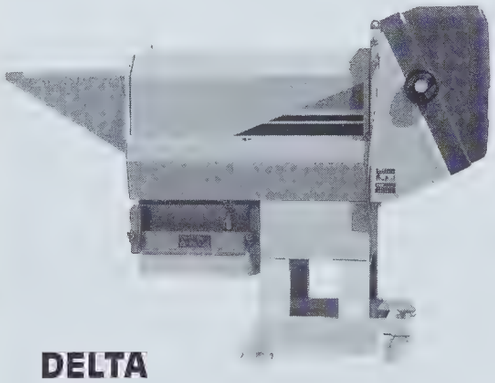
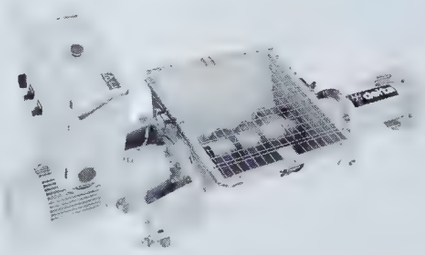


DELTA destemmer/crusher

DELTA must pump



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KLR

Winery Capacity: 25,001 – 50,000 Cases/Year

Replies	Annual Salary Range
8	$26,000 – $39,999
4	$40,000 – $49,999
7	$50,000 – $59,999
3	$60,000 – $99,999
1	$100,000 – $109,000

Average=$48,382 Median=$67,012

Winery Capacity: 51,001 – 150,000 Cases/Year

Replies	Annual Salary Range
4	$42,000 – $49,999
6	$50,000 – $59,999
4	$60,000 – $69,999
4	$70,000 – $91,000

Average=$61,481 Median=$66,550

Winery Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
6	$54,000 – $69,999
4	$70,000 – $79,999
3	$80,000 – $99,999
2	$100,000 – $109,999
1	$110,000 – $150,000

Average=$79,889 Median=$102,000

ENOLOGIST

Winery Capacity: 7,000 – 25,000 Cases/Year

Replies	Annual Salary Range
3	$37,000 – $56,000

Average=$46,000 Median=$46,750

Winery Capacity: 25,001 – 50,000 Cases/Year

Replies	Annual Salary Range
1	$20,000 – $29,999
3	$30,000 – $39,000
2	$40,000 – $58,000

Average=$39,287 Median=$39,000

Winery Capacity: 50,001 – 150,000 Cases/Year

Replies	Annual Salary Range
5	$28,000 – $39,999
9	$40,000 – $49,999
1	$50,000 – $62,000

Average=$42,222 Median=$45,040

Winery Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
7	$35,000 – $49,999
4	$50,000 – $59,999
2	$60,000 – $90,000

Average=$53,265 Median=$62,750

CELLAR MASTER

Winery Capacity: Under 7,000 Cases/Year

Replies	Annual Salary Range
1	$40,000 – $59,999
1	$60,000 – $89,999
1	$90,000 – $92,000

Average=$66,000 Median=$66,000

Winery Capacity: 7,000 – 25,000 Cases/Year

Replies	Annual Salary Range
3	$22,000 – $29,999
5	$30,000 – $39,999
6	$40,000 – $49,999
1	$50,000 – $57,000

Average=$37,315 Median=$39,500

Make Some Wine Happy

CORK SUPPLY USA

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Winery Capacity: 25,001 – 50,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
2	$25,000 – $29,999
14	$30,000 – $39,999
6	$40,000 – $49,999
1	$50,000 – $92,200

Average=$38,431 Median=$58,750

Winery Capacity: 50,001 – 150,000 Cases/Year

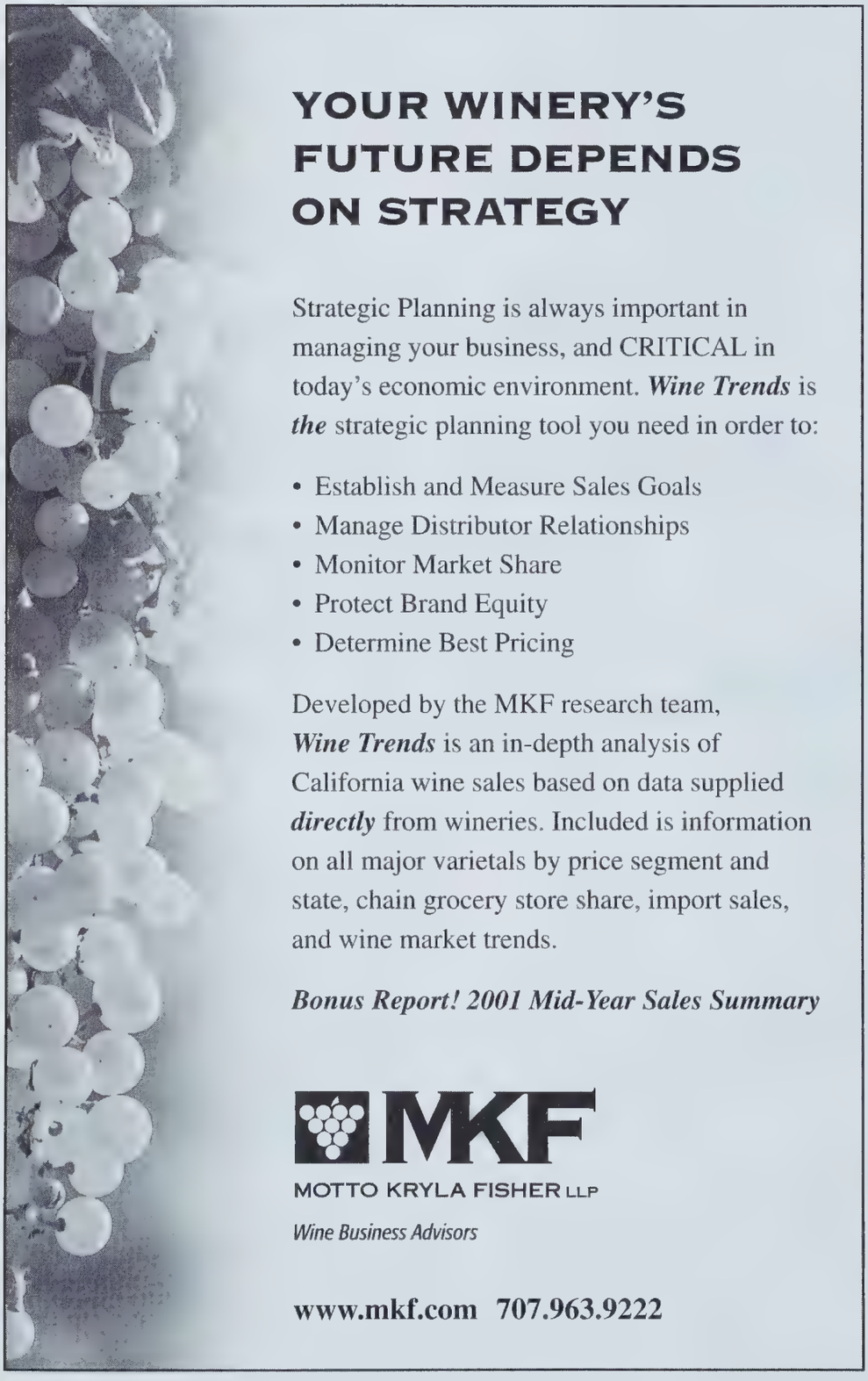
REPLIES	ANNUAL SALARY RANGE
3	$29,000 – $39,999
5	$40,000 – $49,999
9	$50,000 – $59,999
2	$60,000 – $79,999
1	$80,000 – $109,000

Average=$53,098 Median=$68,936

Winery Capacity: Over 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
1	$31,000 – $39,999
4	$40,000 – $49,999
5	$50,000 – $59,999
3	$60,000 – $72,000
1	$100,000 – $104,000

Average=$57,773 Median=$67,860


YOUR WINERY'S FUTURE DEPENDS ON STRATEGY
Strategic Planning is always important in managing your business, and CRITICAL in today's economic environment. *Wine Trends* is *the* strategic planning tool you need in order to:
• Establish and Measure Sales Goals
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• Monitor Market Share
• Protect Brand Equity
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Developed by the MKF research team, *Wine Trends* is an in-depth analysis of California wine sales based on data supplied *directly* from wineries. Included is information on all major varietals by price segment and state, chain grocery store share, import sales, and wine market trends.
Bonus Report! 2001 Mid-Year Sales Summary
MKF
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CELLAR WORKER

Winery Capacity: Under 7,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
2	$16,000 – $19,999
5	$20,000 – $29,999
2	$30,000 – $40,000

Average=$25,496 Median=$28,000

Winery Capacity: 7,000 – 25,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
4	$14,000 – $19,999
6	$20,000 – $29,999
8	$30,000 – $39,999
1	$40,000 – $41,000

Average=$28,042 Median=$27,661

Winery Capacity: 25,001 – 50,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
4	$16,000 – $19,999
15	$20,000 – $29,999
6	$30,000 – $39,999
2	$40,000 – $51,200

Average=$27,691 Median=$33,800

Winery Capacity: 50,000 – 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
1	$13,000 – $19,999
10	$20,000 – $29,999
11	$30,000 – $39,999
2	$40,000 – $44,160

Average=$30,169 Median=$28,976

Winery Capacity: Over 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
4	$18,000 – $29,999
9	$30,000 – $39,999
1	$40,000 – $41,200

Average=$32,709 Median=$29,725

WINERY MAINTENANCE

Winery Capacity: 25,001 – 50,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
6	$18,000 – $29,999
4	$30,000 – $39,999
2	$40,000 – $49,999
1	$50,000 – $73,000

Average=$33,486 Median=$45,860

Winery Capacity: 50,001 – 150,000 Cases/Year

Replies	Annual Salary Range
4	$22,000 – $29,999
4	$30,000 – $39,999
4	$40,000 – $49,999
2	$50,000 – $59,999
3	$60,000 – $64,000

Average=$41,568 Median=$43,155

Winery Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
3	$19,000 – $29,999
4	$30,000 – $39,999
3	$40,000 – $59,999
3	$60,000 – $89,000

Average=$45,499 Median=$54,375

VINEYARD MANAGER

Winery Capacity: Under 7,000 Cases/Year

Replies	Annual Salary Range
2	$30,000 – $39,999
1	$40,000 – $49,999
2	$50,000 – $60,000

Average=$43,851 Median=$45,250

Winery Capacity: 7,000 – 25,000 Cases/Year

Replies	Annual Salary Range
2	$24,000 – $29,999
3	$30,000 – $39,999
2	$40,000 – $49,999
2	$50,000 – $69,999
4	$70,000 – $84,000

Average=$51,989 Median=$54,480

Winery Capacity: 25,001 – 50,000 Cases/Year

Replies	Annual Salary Range
2	$23,000 – $29,999
4	$30,000 – $39,999
6	$40,000 – $59,999
3	$60,000 – $79,999
2	$80,000 – $96,000

Average=$52,005 Median=$59,960

Winery Capacity: 50,001 – 150,000 Cases/Year

Replies	Annual Salary Range
4	$27,000 – $49,999
4	$50,000 – $59,999
2	$60,000 – $69,999
2	$70,000 – $89,999
1	$90,000 – $120,000

Average=$61,656 Median=$73,500

Winery Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
2	$40,000 – $49,999
2	$50,000 – $59,999
2	$60,000 – $69,999
2	$70,000 – $89,999
1	$90,000 – $103,500

Average=$66,178 Median=$71,750

VINEYARD WORKER

Winery Capacity: Under 7,000 Cases/Year

Replies	Annual Salary Range
4	$16,000 – $19,999
4	$20,000 – $29,999
3	$30,000 – $33,100

Average=$24,449 Median=$25,005

Winery Capacity: 7,000 – 25,000 Cases/Year

Replies	Annual Salary Range
5	$14,500 – $19,999
7	$20,000 – $29,999
3	$30,000 – $35,500

Average=$23,727 Median=$25,030

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EQUAL OPPORTUNITY LENDER

SALARY SURVEY

Winery Capacity: 25,001 – 50,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
3	$17,600 – $19,999
6	$20,000 – $29,999
7	$30,000 – $39,999
1	$40,000 – $44,100

Average=$27,493 Median=$30,890

Winery Capacity: 50,001 – 150,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
10	$22,800 – $29,999
4	$30,000 – $33,600

Average=$27,836 Median=$28,231

Winery Capacity: Over 150,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
2	$16,600 – $16,999
7	$20,000 – $29,999
1	$30,000 – $34,320

Average=$23,818 Median=$25,497

CHIEF FINANCIAL OFFICER

Winery Capacity: 7,000 – 25,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
2	$40,000 – $69,999
1	$70,000 – $89,999
2	$90,000 – $99,999
1	$100,000 – $123,000

Average=$82,683 Median=$81,500

Winery Capacity: 25,001 – 50,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
2	$45,000 – $59,999
2	$60,000 – $119,999
1	$120,000 – $133,000

Average=$87,700 Median=$89,000

Winery Capacity: 50,001 – 150,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
2	$60,000 – $69,999
2	$70,000 – $99,999
1	$100,000 – $119,999
2	$120,000 – $129,999
2	$130,000 – $175,000

Average=$111,675 Median=$117,500

Winery Capacity: Over 150,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
1	$84,000 – $89,999
2	$90,000 – $129,999
2	$130,000 – $169,999
2	$170,000 – $281,000

Average=$167,382 Median=$182,500

CONTROLLER

Winery Capacity: 7,000 – 25,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
3	$47,800 – $59,999
2	$60,000 – $81,000

Average=$60,648 Median=$64,420

Winery Capacity: 25,001 – 50,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
3	$42,000 – $49,999
2	$50,000 – $59,999
3	$60,000 – $79,999
2	$80,000 – $103,400

Average=$66,282 Median=$72,700

Winery Capacity: 50,001 – 150,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
3	$40,000 – $49,999
3	$50,000 – $69,999
2	$70,000 – $89,999
2	$90,000 – $98,000

Average=$67,227 Median=$69,000

Winery Capacity: Over 150,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
2	$68,000 – $79,999
4	$80,000 – $99,999
2	$100,000 – $119,999
3	$120,000 – $129,999
2	$130,000 – $160,000

Average=$106,472 Median=$114,000

ACCOUNTANT

Winery Capacity: Under 7,000 Cases/ Year

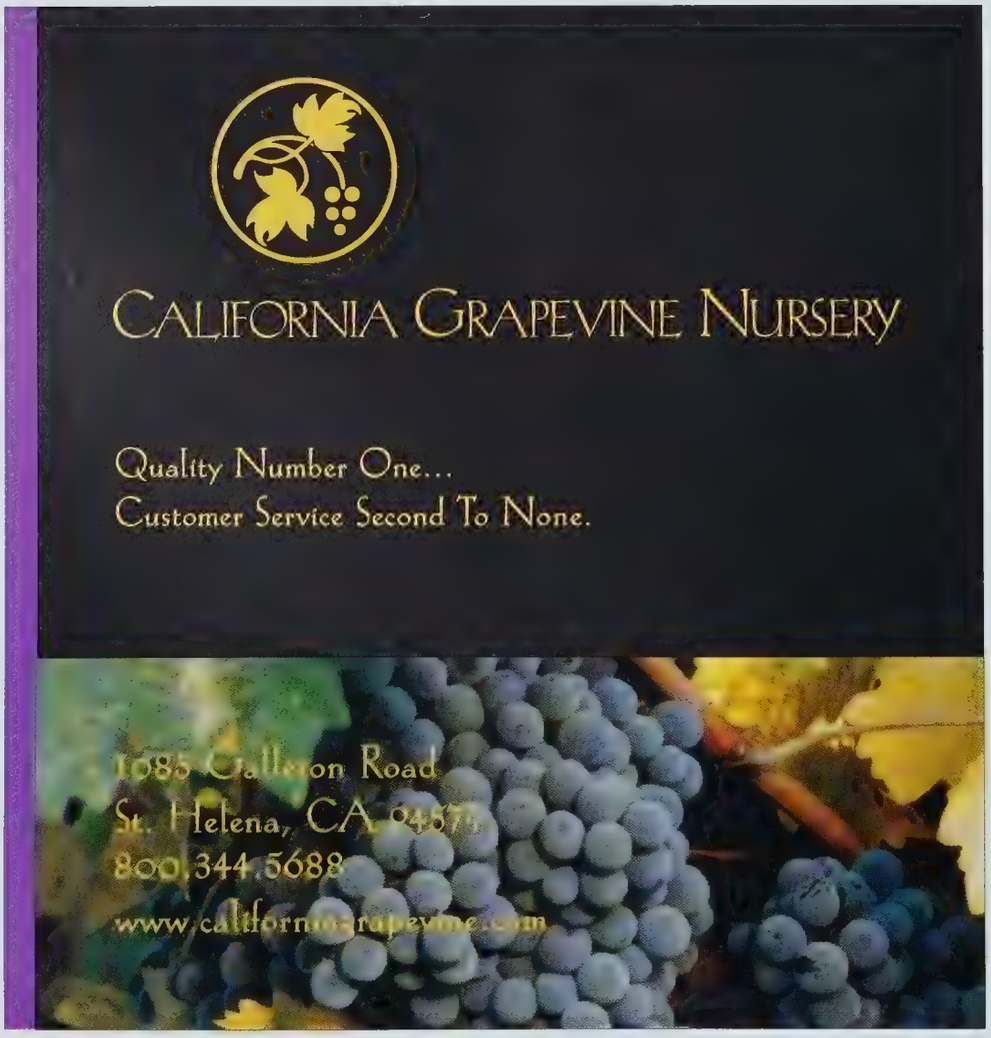
REPLIES	ANNUAL SALARY RANGE
1	$54,000 – $54,000

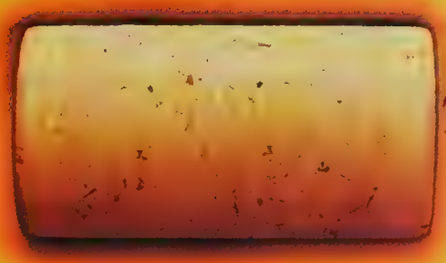
Average=$54,000 Median=$54,000

Winery Capacity: 7,000 – 25,000 Cases/ Year

REPLIES	ANNUAL SALARY RANGE
2	$30,000 – $39,999
2	$40,000 – $49,999
1	$50,000 – $63,000

Average=$43,852 Median=$46,500



The Winemaker.  *The Accountant.*

Let's hear from both sides.

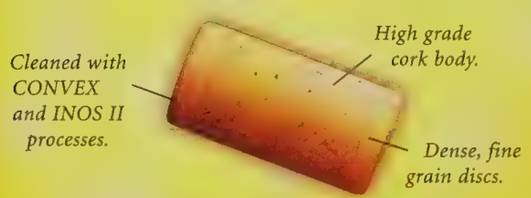
The most important thing for a winemaker is the wine.

After all, that's what our reputation is built on. I understand it's a business. But there's no point putting my heart and soul into a wine and then compromising on the closure.

Sure, bottom lines are a necessity. And necessity, the mother of invention, no doubt led to the development of the new generation Twin Top® cork from Amorim.

For starters, it's cork. That's not me desperately hanging on to tradition. Independent research* has found 'technical' Twin Top® corks compare favorably with whole natural corks and consistently outperform alternative closures across all vital parameters. That means it's better for my wine.

The ends are natural cork discs, cut across the grain so they actually seal better. In the middle is a high-grade granulated cork body.



They're very clean. Twin Top® discs are subject to the world's most advanced cork production technology, including the CONVEX and INOS II washing processes, exclusive to Amorim.

Twin Top.® From Amorim. A top performer no matter which way you look at it. And my seal of approval.

For my money, the bottom line is what really counts.

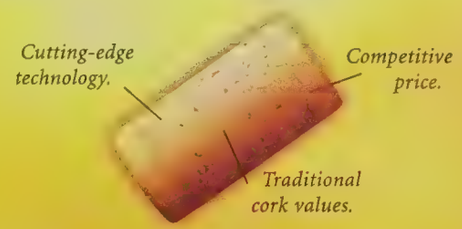
I love good wine and I know good wine costs money to make. But if we don't make a profit, we don't make anything at all.

That doesn't mean you jump at the cheapest closure on the market. You have to weigh cost against performance.

That's why I'm so impressed with the new generation Twin Top® cork from Amorim. It provides exceptional performance at a very competitive price.

In fact, Twin Top® stacks up brilliantly on a cost/benefit analysis in more ways than one.

For instance, the consistent characteristics of Twin Top® means we are spending less time on visual assessment during our quality assurance tests in the lab. That same consistency means we're also getting fewer hold-ups on the bottling line.



And being risk averse, I can sleep easy at night knowing Twin Top® will keep on performing and consumers won't reject our wines because of our choice of closure.

Twin Top.® From Amorim. More sense and less dollars. That's why it's my seal of approval.

AMORIM

TWIN TOP® CORKS. ONLY FROM AMORIM.

For further contact: Amorim Cork America;
Mr. Daryl Eklund Tel: 707-224 6000; Fax: 707-224 7616; Napa Valley - California

*Studies at the Geisenheim Research Institute, Germany, & Excell Laboratory, France. McCANN AMOR0035

SALARY SURVEY

Winery Capacity: 25,001 – 50,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
3	$25,000 – $39,999
6	$40,000 – $49,999
2	$50,000 – $69,300

Average=$43,048 Median=$47,150

Winery Capacity: 50,001 – 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
3	$31,200 – $39,999
2	$40,000 – $49,999
4	$50,000 – $62,100

Average=$46,938 Median=$46,680

Winery Capacity: Over 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
1	$33,200 – $39,999
5	$40,000 – $49,999
3	$50,000 – $59,999
2	$60,000 – $72,000

Average=$51,792 Median=$52,640

MARKETING DIRECTOR

Capacity: Under 7,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
2	$14,500 – $49,999
4	$50,000 – $69,999
1	$70,000 – $105,000

Average=$52,571 Median=$59,750

Capacity: 7,000 – 25,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
4	$38,000 – $49,999
5	$50,000 – $69,999
3	$70,000 – $79,999
3	$80,000 – $89,999
2	$90,000 – $148,000

Average=$70,053 Median=$93,000

Capacity: 25,001 – 50,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
2	$33,000 – $49,999
2	$50,000 – $69,999
3	$70,000 – $79,999
4	$80,000 – $99,999
3	$100,000 – $129,999
1	$130,000 – $179,000

Average=$86,916 Median=$106,000

Capacity: 50,001 – 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
3	$57,600 – $69,999
4	$70,000 – $89,999
3	$90,000 – $119,999
3	$120,000 – $150,000

Average=$96,149 Median=$103,810

Capacity: Over 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
3	$75,000 – $99,999
4	$100,000 – $129,999
3	$130,000 – $149,999
2	$150,000 – $159,999
2	$160,000 – $266,700

Average=$139,002 Median=$170,850

SALES REP

Capacity: 25,001 – 50,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
5	$41,000 – $49,999
2	$50,000 – $79,999
2	$80,000 – $109,000

Average=$61,681 Median=$75,000

Capacity: 50,001 – 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
2	$24,000 – $59,999
3	$60,000 – $79,999
4	$80,000 – $99,999
1	$100,000 – $125,000

Average=$77,870 Median=$74,500

Capacity: Over 150,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
1	$35,000 – $59,999
2	$60,000 – $69,999
5	$70,000 – $79,999
3	$80,000 – $93,700

Average=$73,396 Median=$64,375

TASTING ROOM MANAGER

Capacity: Under 7,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
5	$31,200 – $39,999
1	$40,000 – $49,999
1	$50,000 – $57,750

Average=$37,707 Median=$44,475

Capacity: 7,000 – 25,000 Cases/Year

REPLIES	ANNUAL SALARY RANGE
5	$20,800 – $29,999
5	$30,000 – $39,999
6	$40,000 – $49,999
2	$50,000 – $59,999
2	$60,000 – $92,000

Average=$40,949 Median=$56,400

GORDON GRAPHICS: LABEL ANALYSIS
FILE N° 002
BRONCO WINE CO.
1998 FOREST GLEN
CABERNET SAUVIGNON
On this high profile label, the four-color process art image is enhanced with sculptured brass embossing, along with the brand name type. A solid dark green ink is added for extra depth. The oval and strip label are both glue applied labels.
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Glue Applied Labels
Digital & Traditional Prepress
Foil Stamping, Embossing, and Die-Cutting
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FOREST GLEN
CABERNET SAUVIGNON
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Capacity: 25,001 – 50,000 Cases/Year

Replies	Annual Salary Range
4	$24,100 – $29,999
6	$30,000 – $39,999
9	$40,000 – $49,999
4	$50,000 – $68,200

Average=$41,326 Median=$46,175

Capacity: 50,001 – 150,000 Cases/Year

Replies	Annual Salary Range
8	$25,200 – $39,999
3	$40,000 – $49,999
4	$50,000 – $56,800

Average=$41,113 Median=$41,031

Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
2	$33,000 – $39,999
8	$40,000 – $49,999
4	$50,000 – $69,999
2	$70,000 – $96,000

Average=$52,327 Median=$64,500

TASTING ROOM WORKER

Capacity: Under 7,000 Cases/Year

Replies	Annual Salary Range
1	$16,640 – $19,999
4	$20,000 – $27,500

Average=$22,248 Median=$22,070

Capacity: 7,000 – 25,000 Cases/Year

Replies	Annual Salary Range
6	$16,000 – $19,999
6	$20,000 – $29,999
2	$30,000 – $39,999
1	$40,000 – $44,000

Average=$24,962 Median=$30,000

Capacity: 25,001 – 50,000 Cases/Year

Replies	Annual Salary Range
7	$15,600 – $19,999
13	$20,000 – $29,999
2	$30,000 – $39,999
2	$40,000 – $44,100

Average=$24,686 Median=$29,875

Capacity: 50,001 – 150,000 Cases/Year

Replies	Annual Salary Range
3	$16,640 – $19,999
4	$20,000 – $29,999
7	$30,000 – $39,000

Average=$28,463 Median=$27,820

Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
8	$20,000 – $29,999
4	$30,000 – $36,800

Average=$26,383 Median=$28,419

OFFICE MANAGER

Capacity: Under 7,000 Cases/Year

Replies	Annual Salary Range
7	$33,000 – $39,999
6	$40,000 – $48,750

Average=$40,089 Median=$40,875

Capacity: 7,000 – 25,000 Cases/Year

Replies	Annual Salary Range
11	$28,300 – $39,999
4	$40,000 – $50,000

Average=$36,378 Median=$39,175

Capacity: 25,001 – 50,000 Cases/Year

Replies	Annual Salary Range
3	$25,750 – $29,999
3	$30,000 – $39,999
6	$40,000 – $49,999
2	$50,000 – $69,700

Average=$40,145 Median=$47,738

Capacity: 50,001 – 150,000 Cases/Year

Replies	Annual Salary Range
5	$27,000 – $39,999
4	$40,000 – $49,999
2	$50,000 – $69,999
1	$70,000 – $88,000

Average=$45,465 Median=$57,500

Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
1	$34,000 – $39,999
2	$40,000 – $49,999
2	$50,000 – $76,500

Average=$54,530 Median=$55,250

CLERICAL

Capacity: Under 7,000 Cases/Year

Replies	Annual Salary Range
1	$14,700 – $19,999
1	$20,000 – $29,999
1	$30,000 – $37,280

Average=$26,327 Median=$25,990

Capacity: 7,000 – 25,000 Cases/Year

Replies	Annual Salary Range
6	$23,000 – $29,999
2	$30,000 – $35,260

Average=$26,985 Median=$29,131

Capacity: 25,001 – 50,000 Cases/Year

Replies	Annual Salary Range
3	$16,690 – $19,999
7	$20,000 – $29,999
4	$30,000 – $39,999
2	$40,000 – $47,750

Average=$28,574 Median=$32,222

Capacity: 50,001 – 150,000 Cases/Year

Replies	Annual Salary Range
2	$13,790 – $19,999
5	$20,000 – $29,999
10	$30,000 – $41,000

Average=$28,817 Median=$27,396

Capacity: Over 150,000 Cases/Year

Replies	Annual Salary Range
6	$22,500 – $29,999
8	$30,000 – $39,300

Average=$31,053 Median=$30,900

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VARIETAL REVIEW

DESIGNING A prestige cuvée

BY Eleanor & Ray Heald
Contributing editors

Occasionally, the term "prestige" is used by a French Champagne producer for a *cuvée* that is not a *tête de cuvée* (French term referring to a selected top bottling) or a luxury cuvée. However, as they seek to define the design of such a bottling in California, participating producers in this select ***PWV*** varietal review agree that the most understood term for their product is "prestige cuvée."

For Eileen Crane (Domaine Carneros) prestige cuvée is the "best of the best," and in her case, it is also a specialty cuvée as a *blanc de blancs*. Beyond being the best of what Domaine Carneros has to offer, Le Rêve is a bottling of the best lots, aged an additional 2½ to three years.

For Domaine Carneros, Crane explains, "Le Rêve must match a perceived house style. But there is more flexibility in my crafting a prestige cuvée than there is in developing our flagship vintage *brut*. Each producer in this discussion has a house style for which it is known. Over the last 10 years, that has been one of the great developments in California sparkling wine.

"Prestige cuvées offer more flexibility because they are generally purchased by more sophisticated consumers. Also, they are not the bottling that consumers might choose to celebrate Friday night, even if they are true sparkling wine lovers. A prestige cuvée is a special occasion wine.

"I don't mean it should move outside the house style, but there is more flexibility about how it's constructed."

Oded Shakked (J Wine Company) agrees with Crane about flexibility, but believes that the core issue revolves around a lack of technical definition for prestige cuvée. It's whatever a producer wants it to be. He cites Le Rêve which does not contain Pinot Noir. For J's prestige cuvée, an LD (late disgorged), the meaning is 10 years on the yeast, while the regular J is 3½ to 4 years.

Is the prestige cuvée always the most expensive wine for a California sparkling wine producer? "Since it is our best wine, made only in the best years, and we believe it's recognized by the consumer as that, it will have the highest price," responds Michel Salgues (Roederer).

In Wayne Donaldson's (Domaine Chandon) view, Chandon has probably been somewhat remiss in its approach to a *tête de cuvée* in the French sense. "We blended one in vintage 2000," he notes. "We do not have a name for it yet; it will be released in 2007. The concept for me is that a prestige cuvée must be vintage dated and, as has already been said, must be the best of the best."

At Iron Horse, David Munksgard calls Brut LD, considered the prestige cuvée, a moving target. "Since inception Iron Horse has had some vintages where this category was a brut-style LD or a *blanc de blancs* LD," he explains. "Perhaps some year we'll have a Rosé.

"Here's my analogy: when someone special comes to your home, you pull out the best wine from your cellar that you believe is appropriate for that person. We didn't design a prestige cuvée from vintage 2000 or the two previous vintages. If I don't believe it's special, I refuse to be forced into a corner to make a prestige cuvée each year or every few years. If it means making the larger lot more special, I'd rather go that route. I am trying to raise the bar a little."

What's in a name?

Hugh Davies (Schramsberg) suggests that a new category name like limited reserve might be created. That

sounds a bit more American and consumers might understand it better.

"Frankly," says Davies," we have a sparkling wine called Reserve, which is one of two *tête de cuvées* we produce. It may seem a bit odd to have two heads, but one is a Pinot Noir style and that's the Reserve; the other is J. Schram with a Chardonnay base.

"What defines these wines is that they are made in very limited quantities, so the limited reserve notion represents 2% to 3% of our total annual production. From the get go, these wines are set aside as individual blends and are aged about six years on the yeast.

"Because they are aged longer on the yeast, these two wines require a slightly higher acidity (0.85 to 1.0 TA) as finished wine. We incorporate more barrel-fermented wines, specifically to achieve more flesh, body, and character to layer on top of the lean, sharper acidity.

"For Schramsberg, location is important. Carneros Chardonnay for J. Schram is better than we've found anywhere else. As we've moved forward, more Anderson Valley Pinot Noir has become the backbone of the Reserve."

Bob Iantosca (Gloria Ferrer) has produced a vintage-dated Carneros Royal Cuvée with extended yeast ageing, for top-of-the-line distinction. "At this point," he says. "Carneros Royal Cuvée is alone at the top of what we produce. Only the top wines from a given vintage are considered for this blend.

"As a small winery driven by vineyard ownership (70% of annual need), the thought that we might make a multi-appellation blend does not work. We're committed to Carneros as the name of the cuvée implies. Gloria Ferrer is largely about Carneros and our own vineyards with which we've worked for a long time. We know these vineyards inside and out. Among other factors, we know the best cropping levels for balanced vines related to the house style.

"For this reason, it would be impossible for us to design a prestige cuvée that was inconsistent with the house style."

Rob McNeill (Mumm Cuvée Napa) affirms that like other producers, the prestige cuvée DVX represents the best sparkling wine he can make. "During *assemblage*, it's the first wine that we blend from about 100 different lots," he says. "It resembles our house style, in the sense that, ultimately, it will be composed of some of the lots that have consistent picking parameters, yet go into other bottlings. It has the winemaker's signature, in that we choose some lots that have undergone barrel fermentation and malolactic fermentation (MLF) impacting the wine's overall impression."

PARTICIPATING PRODUCERS:

Eileen Crane, winemaker
Domaine Carneros, Napa, CA

Wayne Donaldson, winemaker
Domaine Chandon
Yountville, CA

Robert Iantosca, winemaker
Gloria Ferrer Caves
Sonoma, CA

David Munksgard, winemaker
Iron Horse Vineyards
Sebastopol, CA

Oded Shakked, winemaker
J Wine Company
Healdsburg, CA

Rob McNeill, winemaker
Mumm Cuvée Napa, Napa, CA

Michel Salgues, winemaker
Roederer Estate, Philo, CA

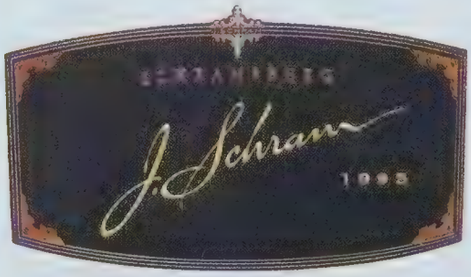
Hugh Davies, winemaker
Schramsberg, Calistoga, CA

Origin or process?

Wayne Donaldson questions whether *méthode champenoise* or the grape's origin have the greater impact on designing a prestige cuvée. He asks, is it MLF, time on yeast (which varies from three to 10 years among participating producers), or other factors?

"My style approach," Donaldson maintains, "is to lead with Chardonnay in the prestige cuvée blend and to limit MLF, but that's related also to a house style. The way the house style is layered in terms of the fruit material origin is another factor.

"We're sourcing from Mt. Veeder, Yountville, and Carneros — choosing the best from these vineyards for a prestige cuvée. But in the future, I want to source from Mendocino also. I believe a winemaker should not be



restricted by appellation or region in attempting to craft a prestige cuvée or any great wine.

"I do believe the vintage concept is important, and Chandon is not going to chase a wine every year if we know the year is not going to deliver. Production volumes will fluctuate."

Along with Domaine Chandon, Iron Horse, Roederer, and Schramsberg do not produce a prestige cuvée annually.

Shakked bottles 25,000 cases of J Brut each year. "The LD is the same wine," he reports. "We don't make a different wine. So we maintain we produce nothing but a prestige cuvée. Every year, we harvest about 30% to 40% more fruit than we intend to bottle. After 10 years on the yeast, we release the wine as LD."

Shakked questions whether production volume is in the prestige cuvée equation. He cites that Dom Perignon, a *tête de cuvée,* has five times the production of J.

Crane explains that when she is on the road selling her wine, consumers will say, "But this is not real Champagne." Her answer is "Yes, and theirs is not real Carneros."

She considers her Carneros vineyard-source fortunate. "North of San Pablo Bay, there's a consistent climate," she notes. "When I started working here, I wanted to vintage date immediately because we were going to go for a minimum of three years ageing on the yeast.

"Claude Taittinger questioned what we would do in the poor years. I explained that in my 10-year experience working with Carneros fruit, there had never been a bad year. In the Champagne district of France, producers work with an entirely different set of parameters. Comparisons between Champagne and California sparkling wine make no sense.

"But the issue of origin or process is interesting. I believe that any of us could move into the other one's winery and make a *méthode champenoise.* Without question, it would be a nice, reputable wine because we all know how to make fine sparkling wine. Like any great wine, great sparkling wine is a wine of a place."

Assessing the variables

All producers use Chardonnay and Pinot Noir, and in some years, Domaine Carneros may include Pinot Blanc up to 15% in Le Rêve. The 1995, for example, had only 1% Pinot Blanc, but the 1994 had 8%.

"Since I'm making a *blanc de blancs* prestige cuvée," Crane remarks, "I don't have Pinot Noir as an option."

When Davies performs the assemblage, he does exactly what McNeill suggests. The prestige cuvées are the first to be assembled. "Typically," he comments, "our aim is to end up with higher (0.95 to 1.1) acid in the base blend."

"...The only way I've found to keep yeast happy is to give them what they need at the appropriate moment — and that's O_2." Dave Munksgard

Iantosca believes that Carneros Chardonnay, a component in a number of the wines under discussion, has few limitations. "Carneros Chardonnay has no acidity problem, unless one wants to call it too much.

"Picking Carneros Chardonnay is a labor of patience. Often, the malic acid is very high. If the harvest trigger is pulled too quickly, the wine will easily have a TA of 1.1 or 1.2. Those levels don't contribute to longevity, only to a wine that's too acidic.

"The other issue is that Gloria Ferrer, in particular, has done significant clonal research with Pinot Noir and how each clone grows in the Carneros. That's a raw material issue that needs consideration."

Due to phylloxera, Gloria Ferrer has had the opportunity to replant several of its vineyards. Iantosca reports that the Wente selection and UCD 13 (Martini Clone) of Pinot Noir continue to be planted. UCD 32 (imported first by Roederer), and Colmar 538 also work well for sparkling wine.

Basically only one Chardonnay clone is planted at Gloria Ferrer, but it is referred to as UCD 4, or UCD 108. "My understanding is that UCD 108 and UCD 4 are different length heat treatments," Iantosca explains. Thirteen clones or selections of Chardonnay are now being evaluated.

"We have what we have at Iron Horse," Munksgard adds. "We are currently replanting an old vineyard, and we don't know the clones that were originally planted. We need to be honest, most of us with older vineyards do not know the clonal material. When they were planted, budwood was sourced from another grower.

"I'm actually quite happy with what we have. Older vines are beginning to exhibit site-specific characters. To establish building blocks for blending, we attempt to pick each block at its optimum level.

"We're not focused on clones of Pinot Noir or Chardonnay for sparkling wine. Our LD comes from bench trials. With those that I've made, I don't find myself going back to one particular block that's better for the LD than another. I focus on the wine that best expresses the style I'm trying to achieve. So far, it's neither a clonal or block issue for Iron Horse."

Protection against oxidation

Both Mumm and Schramsberg protect against oxidation of the fruit. Iantosca suggests that to protect against oxidation invites stuck fermentations and results in higher phenolic levels in the must.

"Unless I'm mistaken," Davies responds, "most sparkling producers add SO_2 to the must at pressing."

Donaldson counters, "Sometimes yes, sometimes not."

"We do add SO_2," Davies continues. "As we move through the sparkling wine process, I believe we all continue to work on the answer to what makes a great sparkling wine. To a certain extent, there's an oxidative quality that one wants to attract for nutty and toasty characters that add complexity, especially at the prestige cuvée level. It's important to monitor the level of oxidation throughout the entire winemaking process."

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Munksgard observes, "What happens in the press pan, happens. If picking occurs later in the day, I may choose to add a little SO_2, but I'm not going to run around with a CO_2 or argon hose and start blanketing juice.

"I like happy yeast. The only way I've found to keep yeast happy is to give them what they need at the appropriate moment — and that's O_2."

Crane does nothing to protect against oxidation. Six to eight hours prior to inoculation, about 15ppm SO_2 are added. Once fermentation completes, the wine is racked off the yeast lees.

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"Because the wine is going to go through a second fermentation, only a modest amount of SO_2 can be added to wine in the tank," she explains.

When Shakked speaks about oxidation, his reference is to enzymatic oxidation. To this end, juice temperature is important, especially if grapes come into the winery a little warmer than desired. SO_2 does protect against the same enzyme that browns apples and destroys delicate aromas. His preference leans toward yeast autolysis characters rather than those that are oxidative.

Salgues strictly follows the Champagne method. Sulfiting in the press pan is considered necessary. "We do not do enzymatic pressing or blanket the tanks," he says. "I like to say we protect, but not overly protect."

Blend ratios

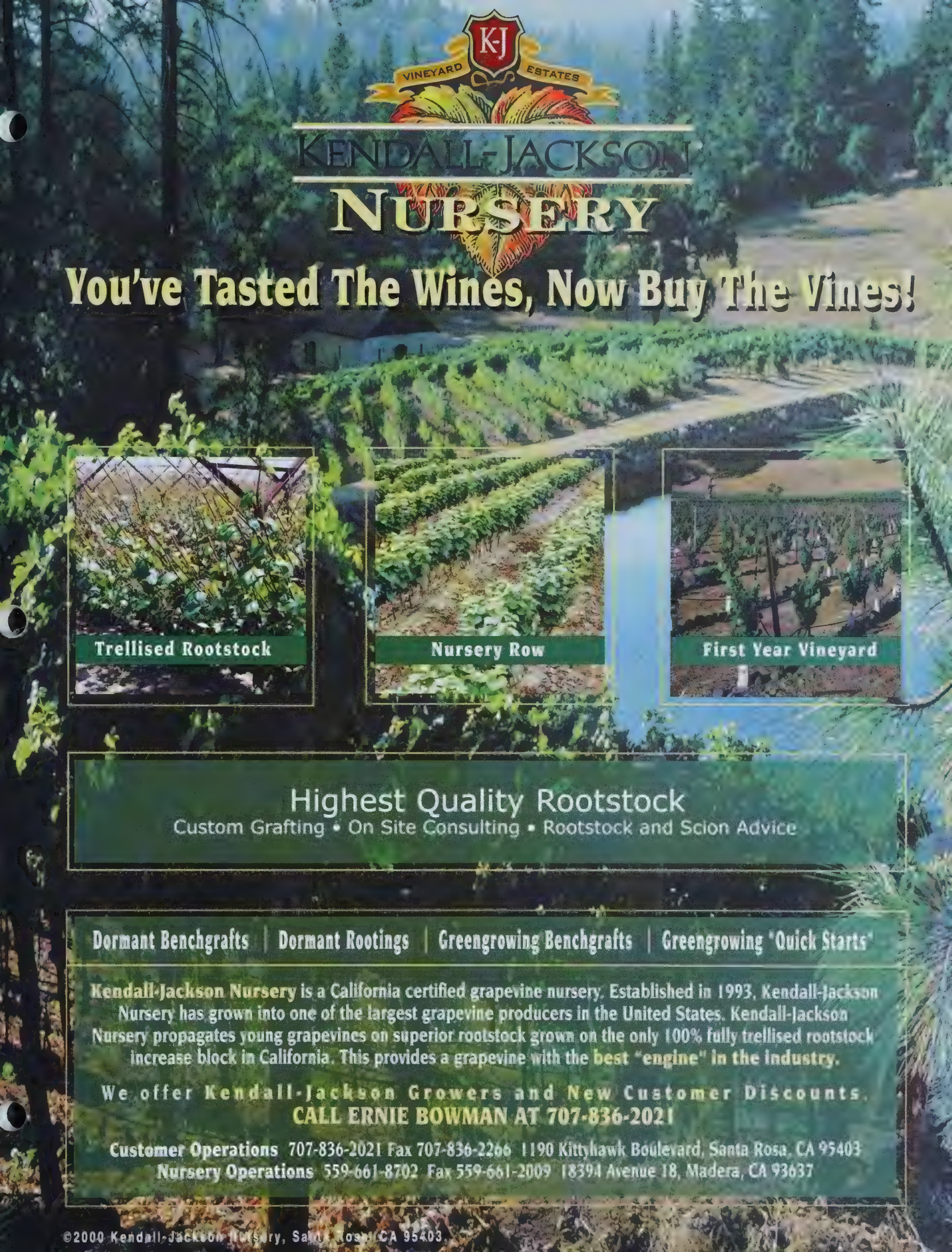
Gloria Ferrer's Carneros Cuvée is about two-thirds Pinot Noir, yet Iantosca says his aim is to balance Pinot Noir and Chardonnay characters, while tipping the balance of flavors toward Chardonnay. "Our Carneros Chardonnay is strongly flavored compared to the characteristics of Pinot Noir.

"Typically, Chardonnay has 50% more total phenols than our Pinot Noir. So, the Chardonnay can add astringency and bitterness to the finish. Tipping Chardonnay flavors just past the balance point makes the wine more interesting, offers some spicy notes, and contributes to longevity."

J. Schram, a Chardonnay-based sparkler, is not a *blanc de blancs* as is the case with Le Rêve. Typically, it includes 20% to 25% Pinot Noir. The Schramsberg Reserve is just the reverse, 75% Pinot Noir and 25% Chardonnay.

Is Le Rêve a *blanc de blancs* because Taittinger's Comptes de Champagne is? "You might say, there was a little inspiration there," Crane quips. "But it was easy and a natural. What Bob (Iantosca) is calling strong, I call concentration. Our Carneros Chardonnay has great concentration at reasonable picking parameters for sparkling wine.

"When we make sparkling wine, we don't add oak. The quality of the fruit is there and it's luxurious. Using nearly 100% of our Carneros estate Chardonnay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and Pinot Blanc can be compared to Beluga caviar. You don't need chopped eggs and chopped onions; you let it express its own character.

"Each year in the blending sessions, we know when the Carneros Chardonnay is complemented by Pinot Blanc and how much. Sometimes it adds a balance nuance to the slightly forward and mid-palate. When I taste it, I know whether the Chardonnay and Pinot Blanc go together and when they don't."

Munksgard believes that blending is the single, most difficult process. "I've never been able to explain to anyone how a winemaker approaches a blending trial. I've spent hours yakking away only to have the person stare at me with a glazed look.

"It all boils down to experience and familiarity with a particular fruit source. A little more of one lot or one variety simply fills in ruts and holes that can be detected only through experience."

What counts at the prestige level?

Certainly, though, there are specific characters that count on the route to designing a prestige cuvée.

For Donaldson, it's structure, intensity, and seamlessness on the palate. He does not focus that much on flavors. Creaminess, texture through the middle, persistence, and length also top the list.

"I do not look for any complexity derived from MLF." Michel Salgues

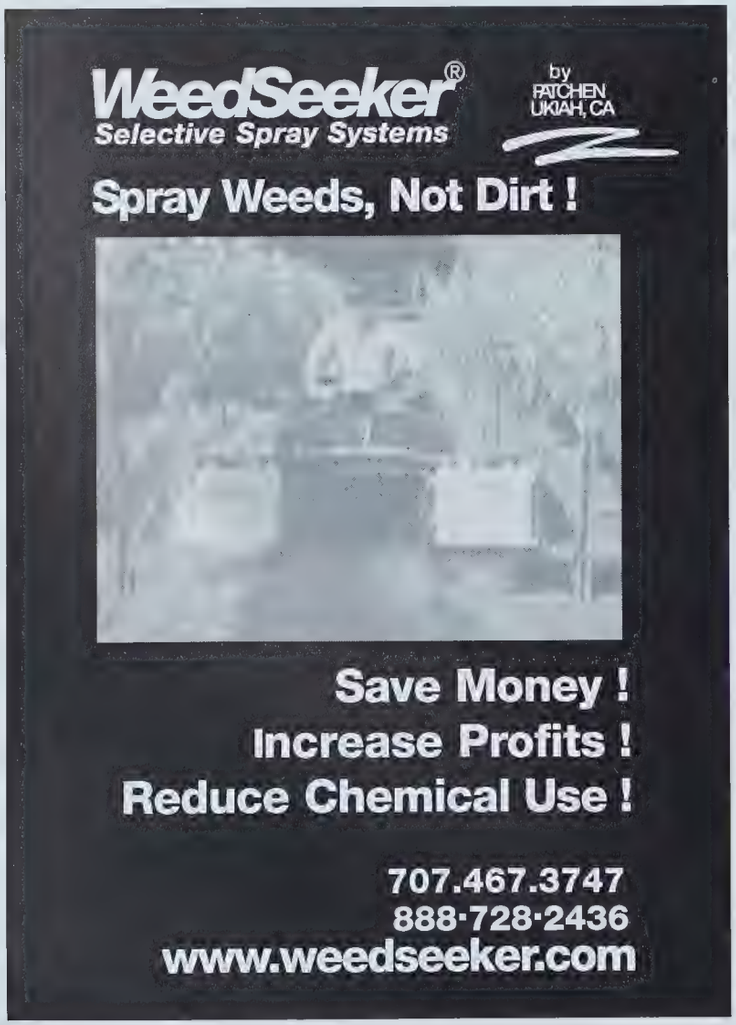
Munksgard looks for Pinot Noir lots that aren't the loudest on the bench, but they are not the most quiet. "In a subtle way," he says, "they speak the language of what I'm looking for. It's restrained and yet saying, 'I'm Pinot Noir.'

"For Chardonnay, it's not the one that's too tightly structured. If it is, it probably won't have bloomed by disgorging time. The chosen wines for the blend must indicate that they will go the distance.

"It's like a race car. I want it to be mean and lean, but not so lean that when it's finally disgorged, all one perceives are harsh acid edges along with some yeast. I also want creamy characters to show in the chosen blend. But these are really hard things to put into words."

Shakked seeks seamless integration of aromas and flavors. He aims for as much layered complexity as the vintage can offer while keeping an overall impression of elegance. "There's no way I can define elegant," he maintains. "It's in my mind somewhere.

"One falsehood is that sparkling wine producers look for a neutral base



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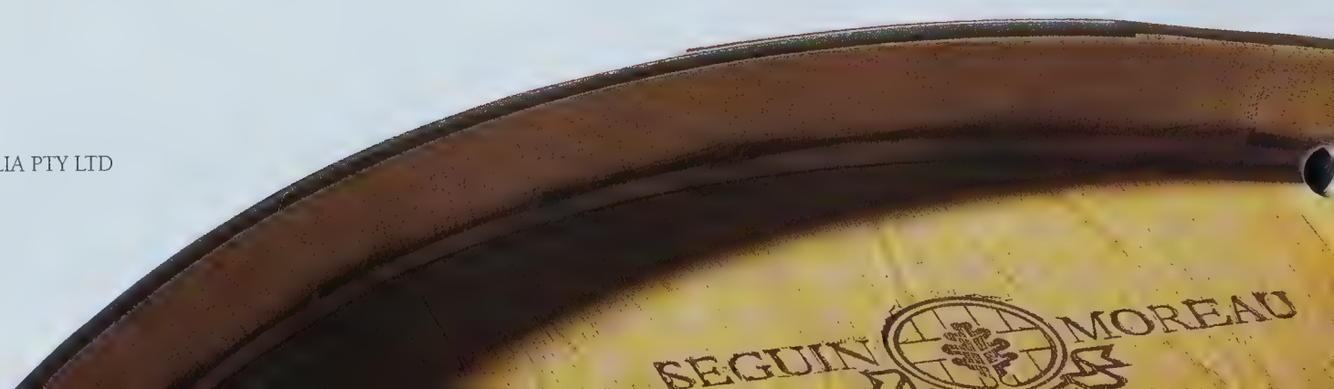

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wine. A neutral base, makes a very neutral and uninteresting sparkling wine."

Iantosca agrees with an early creamy perception in the base wine. "If I can achieve that point where there's a little racy acidity, wonderful viscosity, length of finish, and some creamy mouthfeel, then I imagine the mousse on top of that. That wine will not be too tight or aggressive in any way."

For a prestige cuvée, Crane believes that the finish is critical, as it is for any great wine. "One never marks a wine as truly great unless the finish is there," she emphasizes.

Davies details Schramsberg's skeleton for achieving a base wine for the Reserve and J. Schram. Initially, the stainless steel lots that are non-MLF are evaluated first for the backbone (at 60%) of the blend. Acidity and finish are the main focus moving toward a seamless impression.

Creaminess and viscosity, typically coming from barrel and MLF fractions, are layered on top. Lastly, a trip back to the stable to look at the loud wines Munksgard spoke about offers a kick, in one way or another, to the last 5% to 10% of the blend.

"Of all the regions of France, Champagne is the most image-driven, and we compete with that."
Rob McNeill

Reserve wines are considered part of the "stable." At Schramsberg, they are retained in neutral oak puncheons (130-gal). Some ageing of wines is done in stainless steel tanks, but typically, the top lots are in puncheons.

MLF and creaminess

To develop creaminess and fine texture, McNeill reports that MLF is important for DVX as 20% to 30% of the blend, coming from four to five Pinot Noir lots and the same number of Chardonnay lots. "Early on," he says, "diacetyl character may be noticed on the MLF lots, but it does reduce and disappear after secondary fermentation."

Munksgard maintains that creaminess may also be developed without MLF. "The site, the vineyard, the cooler the juice, lower phenolic levels at the press, lower bottle pressures, and the vintage may all offer it," he notes. "Just doing everything correctly creates many great characters. It all revolves around attention to details."

Crane suggests that she blends about 5% to 8% of fractions that have undergone MLF.

"Let's talk about vintages," Munksgard continues; "1997 was a low acid vintage; in 1998, we harvested about a month later; 1999 was six weeks later than 1997. We had significantly higher acid levels in both 1998 and 1999 than we did in 1997. A winemaker responds to this and does what's appropriate."

To make the best judgements, Munksgard constructs a spread sheet for all Chardonnay juice lots before they complete fermentation. He views projected TAs and decides how much wine should complete MLF in order to lower the TA to a level he considers appropriate. He chooses the tanks he believes will most easily go through MLF.

He does not allow Pinot Noir lots to undergo MLF because he does not like the character that develops. "Since Pinot Noir goes through MLF more easily, it might be the winemaker's choice," he suggests. "But the fruit becomes much more degraded (loses fresh, bright fruit) by the MLF process than Chardonnay.

"With MLF and Pinot Noir, a number of textural elements are picked up. However, I'm trying to preserve bright fruit."

Salgues notes that a typical malic acid level for his Anderson Valley fruit is easily 5 to 6 g/L. He views MLF as only a tool to reduce acidity. "I do not look for any complexity derived from MLF," he emphasizes.

"As soon as MLF completes, the wine must be racked immediately to avoid undesirable by-products that develop at the end of MLF. It is, however, my preference not to do any MLF because it is a pain."

Davies notes that of about 120 lots of wine destined for Schramsberg's sparklers are those that did not complete MLF. They are sulfited and result in some of the very best lots destined for the prestige cuvées, which are membrane-filtered.

" Very high quality sparkling wine, on a par with the very best made in Champagne, can be made in California."
Hugh Davies

Shakked contends that his work has shown a loss of fruit flavor and mouthfeel in wines that have partially undergone MLF and subsequent

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membrane filtering. "I agree with Michel (Salgues) about MLF. Actually, to have lower acid levels and to attain creaminess and other complexities, I prefer to pick at slightly higher sugars, press to a maximum of 130 gal/ton, and avoid MLF totally."

Crane adds that time on yeast adds to creaminess. She also believes that the bubbles become more integrated over time.

Dosage

"When discussing dosage, I dislike the term syrup," Salgues emphasizes. "I think the French term *Liqueur d'Expédition*, or LEX for short, should be used." Donaldson suggests Liqueur Dosage. Participants shortened it to simply dosage.

"For DVX," McNeill explains, "we use a dosage that re-emphasizes the wine, but does not change it. To us that's the most important factor. Hence, we do not use a super-ripe fruit table wine to make the dosage or do anything like that. Such techniques upset the balance we've striven to attain from the vineyards forward through each process in winemaking."

For Roederer, the dosage is composed of wines that have aged in cask from five to 10 years.

To disrupt the wine as little as possible, Crane retains the same wine as is in the bottle for dosage.

Ageability, consumer expectation, and acceptance

"Most consumers," Crane remarks, "do not have a clue how long these wines can be cellared and how good they would be if they were. A lot depends on the consumer we're talking about. Do they like a Champagne that is heavily Pinot Meunier?

"We need to sell image because some people who buy top Champagnes and who are potential consumers of prestige cuvées are into buying image." Eileen Crane

"Is the wine better with more age? I think we'd all say that our prestige cuvées are. But they are different wines, and they may not meet an individual consumer's preference.

"There are also regional preferences. West Coast consumers prefer fresher sparkling wines. On the East Coast, a heavier, perhaps slightly more oxidized wine is the choice.

"I believe that a properly cellared California prestige cuvée will age 15 to 20 years."

McNeill agrees with this, provided the cork is of the highest quality. "We spend more for the DVX corks than for the closures on our other sparkling wines," he maintains.

Crane agrees, "A bad cork is the fastest way to ruin a bottle of wine."

American acceptance of prestige cuvées

"We have a lot of work to do to educate consumers about California prestige cuvées," McNeill suggests. "Of all the regions of France, Champagne is the most image-driven, and we compete with that."

Davies believes that what will determine marketplace success of California prestige cuvées, at their higher price point, is to work to share a piece of the pedestal that the French Champagne moniker has, not only in the U.S., but throughout the world.

"Even at the $25 to $30 price range," Davies maintains, "there's a lot of

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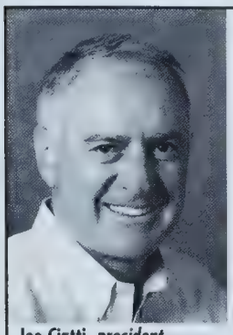
resistance in the minds of many consumers to buying a product that is not Champagne, let alone pricing at $50 or more (price range for participants' wines is $32 to $75). We try to beat the drum about the excellence of our products as loudly as we can. We keep repeating, 'Very high quality sparkling wine, on a par with the very best made in Champagne, can be made in California.'

"It could also probably be done in some other region of the world, but I believe producers are not trying as hard as we are in California. There's a great story to sell about the excellence of California sparklers."

Crane acknowledges that an effort to do cooperative marketing of California sparkling wine has not been in effect for about five years. Largely, she says because there has been a significant turnover in personnel who ran the program.

"While we share technology from vineyard to winery," Shakked contends, "we are a total failure as far as working together on marketing. One of the reasons has to do with French ties. U.S. consumers want to call the California product Champagne and are tired of hearing us correct them and instructing them to call our wines sparkling wines.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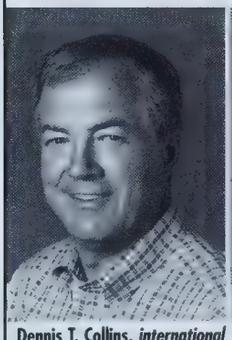
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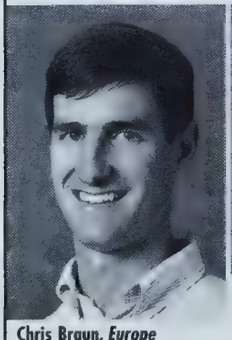
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"We have not made our product approachable enough for consumers. They know the name Champagne. Also, I believe, U.S. consumers are into what's big in wine. Big reds, big Cabernets. We talk about elegance and finesse with our wines, and they are not appreciating that aspect yet."

Crane acknowledges efforts, even on the part of some Champagne houses to capture the youth market with whatever will pop. "But," she says, "those participating in this discussion are not making just a fizzy product.

"We need to sell image because some people who buy top Champagnes and who are potential consumers of prestige cuvées are into buying image. They may not understand the best of the best." ■

TASTING NOTES

Domaine Carneros 1995 Le Rêve

Color/Aroma: light yellow; tropical fruit, citrus, kiwi, honey, melon, pears, and dried apricot.

Flavors: lengthy grape/apple, great fruit flavors, soft, fleshy, round, elegant, and creamy.

Balance/Finish: soft, round and elegant with outstanding mouthfeel.

Domaine Chandon 1995 Brut

Color/Aroma: medium yellow; light doughy yeast, biscuity, honey-cream, and delicate fruit.

Flavors: berry, honey, pears, peaches, caramel, bready, delicate fruit, and flavorful with viscosity.

Balance/Finish: big, rich mouthfeel; excellent weight and length.

Gloria Ferrer 1992 Carneros Cuvée

Color/Aroma: pale yellow; dough, delicate fruit with hay-like notes, Chardonnay aromas, and cinnamon-like spice.

Flavors: lemon, bright citrus, fruitful, brioche, croissant, toasted nut, and dark chocolate.

Balance/Finish: rich, creamy full palate and well-balanced.

Iron Horse 1991 Brut LD

Color/Aroma: medium gold; clean, fresh, toasty, elegant, and complex aged nose.

Flavors: apple, citrus, bright fruit, persistent, and complex

Balance/Finish: medium full and very long, crisp finish.

J 1990 Brut LD

Color/Aroma: darker gold; honey, touch of powdered milk, heavy toast and pineapple jam.

Flavors: oxidized, round, apple skins, touch of olive, citrus, lime, orange peel, and slight soy.

Balance/Finish: good Pinot Noir/Chardonnay balance, long and lingering, astringent, dominated by woody notes and slightly coarse.

Mumm Cuvée Napa 1996 DVX

Color/Aroma: pale straw; fresh, youthful, delicate elegant, citrus and lime blossom, apple, berry, blanched almonds, and yeast autolysis character.

Flavors: cherry, apple, and apricot mosaic; rich, full front palate with cream, honey, and delicate lemon.

Balance/Finish: medium body, tightly focused, and well balanced

Roederer Estate 1994 L'Ermitage

Color/Aroma: light gold; bran, honey, baked apple, nutty layers, slight popcorn. Evolved aromas of toast and brioche.

Flavors: berry, soy, slight sherry note, brown sugar, and some vanillin; mouth filling

Balance/Finish: full-bodied attack; very good length and creaminess.

Schramsberg 1993 J. Schram

Color/Aroma: light gold; honey, vanilla, marshmallow, marzipan, and classic autolysis.

Flavors: yeasty, appley, wonderfully alive, honey and caramel, delicate spice, and complex richness.

Balance/Finish: very good entry, lush middle, long and viscous finish.

PWV thanks Domaine Carneros for hosting the discussion/tasting.

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Irrigation of winegrapes in California

BY Larry E. Williams
Department of Viticulture & Enology
University of California-Davis, and
Kearney Agricultural Center

SYNOPSIS: How much irrigation water is required to grow quality winegrapes depends upon site, the stage of vine growth, row spacing, size of the vine's canopy, and amount of rainfall occurring during the growing season. Below, growers are presented with means to determine when irrigations should commence and to calculate full vine water use based on the results of 10 years of field trials in California winegrape growing regions. Implications for such information to assist in vineyard irrigation management are included.

Coastal, winegrape production areas in California are characterized by warm days and cool nights, although high temperatures (104º to 116ºF) may occur for a few days each growing season. Some areas may have fog lasting late into the morning.

Rainfall is greater in northern coastal valleys and diminishes as one travels south. In coastal valleys, evaporative demand can range from 35 to 50 inches of water throughout the growing season (between budbreak and the end of October).

Many of the soils in the coastal production areas are clay loam to clay-type soils, which at field capacity, generally hold more water than sandy-type soils. Since the majority of rainfall occurs during the dormant portion of the growing season in these areas and vineyard water use can be greater than the soil's water reservoir after the winter rainfall, supplemental irrigation of vineyards may be required at some point during summer months.

IRRIGATION MANAGEMENT

No matter where grapevines are grown, two major questions concerning vineyard irrigation management must be answered: 1) When to start? and 2) How much water to apply?

When to start irrigating

Deciding when to begin irrigating can be determined several ways. Soil-based tools such as a neutron probe and capacitance sensors can determine the actual or relative amounts of water in the rooting zone of grapevines. Plant-based tools, such as a pressure chamber, can be used to measure vine water status.

Regardless of the method, a "value" is determined which indicates that the vines may need water. Once this value is reached, an irrigation event should occur.

Using a pressure chamber

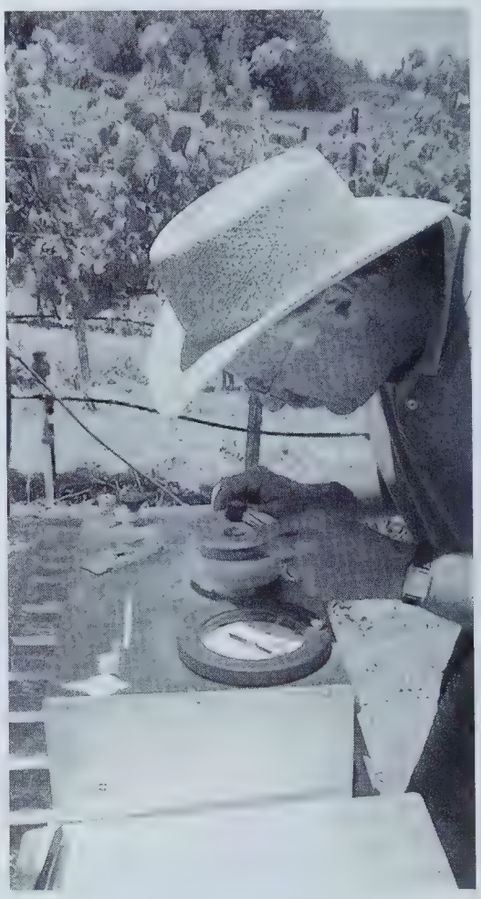
Water has free energy, a capacity to do work. In plants, water's free energy (or chemical potential) is usually referred to as "water potential." Pure water will have a water potential of 0 bars (bar is the unit of measurement).

Any solute (such as sugars, mineral ions, and amino acids) added to water will lower its water potential, *i.e.* the water potential will become more negative. The same can be said of a plant's water potential.

For example, when more water is lost from a leaf via transpiration than moves into the leaf from the vascular tissue, its water potential will become more negative due to a relative increase in its solute concentration. This is important as water in plants and soils moves from regions where water potential is relatively high to regions where water potential is relatively low. Such differences in water potential will result in movement of water from cell to cell within a plant or from regions within the soil profile that contain more moisture to those with less.

One way to measure the water potential of a plant organ in the field (such as a leaf) is by using a pressure chamber.

The leaf's petiole is cut and the leaf quickly placed into the chamber with the cut end of the petiole protruding out of the chamber. Once the leaf is



Randell Johnson (Hess Collection Winery, Napa, CA) uses pressure chamber. (Photos by Richard Camera.)

removed from the plant, the tension in the petiole's xylem is released and the sap withdraws from the cut surface and moves into the blade.

As the chamber is pressurized, the water potential of the leaf is raised by the amount of pressure applied so that at the **balance pressure** (the pressure required to force the sap to the surface of the cut end of the petiole), the water potential is zero. The original leaf water potential plus the balance pressure equals zero. Therefore, the **negative** of the balance pressure equals the original leaf water potential.

A more complete explanation of the pressure chamber technique, theory, possible errors, and problems can be found in "Measurements of plant water status," Hsiao.[2]

The water potential of a plant leaf will be greatest at pre-dawn, then decline (become more negative) during the day to reach a daily minimum, then increase as the sun sets. This type of pattern will occur regardless of the availability of water in the soil profile.

However, pre-dawn and midday minimum values will be more negative for plants experiencing soil moisture deficits than those given greater amounts of water.[7] Thus, leaf water potential can be used to estimate the water status of a plant. Units of water potential are expressed in bars, as mentioned above, or megapascals (MPa) (1.0 MPa = 10 bars).

In all of my irrigation trials, I have measured leaf water potential to assess vine water status. I usually measure midday leaf water potential between 12:30 and 1:30 PM. I select mature, fully expanded leaves exposed to direct sunlight (no shading on the leaf). I have found that any fully expanded leaf on the outside of the canopy will be appropriate as long as it is not senescent (starting to turn yellow), diseased, or suffering from insect damage.

The leaf blade is enclosed inside a plastic bag (plastic sandwich bags are satisfactory) and then the petiole is cut with a **sharp** razor blade. The plastic bag enclosing the leaf blade is to minimize transpiration between petiole excision and pressurization within the chamber. I have found a difference in leaf water potential of 2 to 3 bars between bagged grape leaves and those that were not bagged (the latter being more negative).

The bagged leaf is placed inside the chamber with the petiole sticking out (see photo). The time from enclosing the leaf inside the plastic bag to placing it inside the chamber should be 10 seconds or less. The chamber is pressurized with compressed nitrogen until the sap **just** exudes from the cut end of the petiole. If the sap forms into a lens or hemisphere, then the sample has been over-pressurized.

The recommended rate of pressurization is less than 1 bar per second initially, then slowed to less than 0.2 bar per second as the balancing pressure is approached.[2] The end point should be observed with a magnifying lens and adequate light.

While the above description of the pressure chamber involves use of compressed nitrogen, a new chamber has been developed that doesn't require compressed gas cylinders. This chamber is pressurized via a manual pump and is very portable.

Water potential values obtained by using this technique can be dependent upon ambient vapor pressure deficit (VPD), which increases as relative humidity decreases; temperature and light, because all of these contribute to evaporative demand; time of day the measurement is made; and the amount of water in the soil profile.

Since, time of day is very important, and the evaporative demand will vary considerably throughout the day, I limit taking leaf water potential measurements to one-half hour on either side of solar noon. That is when a grapevine uses the greatest amount of water on a daily basis.[6]

I have found that midday leaf water potential values of fully irrigated vines on a day of low evaporative demand (ambient temperature at the time of measurement 85ºF) will be approximately 1 bar higher (less negative) than on a day when ambient temperature is 98ºF at the time of measurement. This is also true for vines that are deficit-irrigated.

One can also assess vine water status by taking water potential readings prior to sunrise (pre-dawn leaf water

The petiole should be carefully observed in order to capture the measurement when the sap just exudes from the cut end.

potential) or by measuring stem water potential at midday.

Stem water potential is determined by enclosing a leaf in a plastic bag surrounded by aluminum foil, at least 90 minutes prior to when readings are to be made. This procedure eliminates transpiration and the leaf water potential will come into equilibrium with the water potential of the stem (*i.e.* stem water potential).

A recent study on almond trees has shown that water potential values measured on shaded leaves (covered with a damp cloth just before leaf excision) are very similar to values of stem water potential.[1]

Table I — Crop coefficients for a VSP trellis as a function of degree-days (DDs) from budbreak and row spacing. Degree-days (DDs) are expressed in Centigrade (C) and Fahrenheit (F). Base temperatures used in calculating DDs are 10°C and 50°F.

DDs (C)	DDs (F)	k_c 6 ft*	k_c 7 ft	k_c 8 ft	k_c 9 ft	k_c 10 ft
100	180	0.17	0.15	0.13	0.12	0.10
200	360	0.22	0.19	0.17	0.15	0.13
300	540	0.28	0.24	0.21	0.19	0.17
400	720	0.35	0.30	0.26	0.23	0.21
500	900	0.42	0.36	0.31	0.28	0.25
600	1080	0.49	0.42	0.37	0.33	0.29
700	1260	0.56	0.48	0.42	0.37	0.33
800	1440	0.62	0.53	0.46	0.41	0.37
900	1620	0.67	0.58	0.51	0.45	0.40
1000	1800	0.72	0.62	0.54	0.48	0.43
1100	1980	0.76	0.65	0.57	0.50	0.45
1200	2160	0.79	0.67	0.59	0.52	0.47
1300	2340	0.81	0.69	0.61	0.54	0.48
1400	2520	0.82	0.71	0.62	0.55	0.49
1500	2700	0.82	0.71	0.62	0.55	0.49

*The equation used to calculate kcs for the 6-foot row was:

$$k_c = 0.87/(1 + e^{(-((x-525)/301))})$$

where x is degree-days in centigrade.

Table II — The effect of trellis type and row spacing on estimated vine water use of grapevines assuming an ET_o of 1.5 inches for the time frame used. HD stands for a high density planting, 1 m x 1 m, using a smaller version of a VSP trellis.

Trellis Type	Row Spacing	ET_o (inches)	k_c	ET_c (inches)	ET_c (gal/acre)	ET_c (gal/vine)
VSP	6 ft.	1.5	0.81	1.22	33,550	27.8
VSP	9 ft.	1.5	0.54	0.81	22,275	27.6
Lyre	9 ft.	1.5	0.83	1.25	34,375	42.5
HD	1 m	1.5	0.91	1.37	37,675	9.3
GDC	12 ft.	1.5	0.75	1.13	31,075	51.4

Assumptions: Vine spacing for all trellises is 6 ft., except in the HD vineyard. Therefore vine density is 1,208, 808, 808, 604, and 4,049 vines per acre for the VSP 6 ft. row, VSP 9 ft. row, Lyre, and GDC trellis and HD planting, respectively. The k_cs used for the VSP 6 and 9 ft. rows is from DDs (C) 1300 row in Table I. Other k_cs used are from L.E. Williams, unpublished data. ET_c in inches was obtained by multiplying ET_o by the k_c. It was assumed that there is 27,500 gallons per acre-inch of water.

I have compared leaf water potential of leaves under naturally occurring shade with stem water potential values of grapevines this past summer and found the two are very similar in some instances. In other instances they were not.

I believe the discrepancy is due to the fact that on some trellis systems (such as the VSP), it is difficult to find leaves that are completely shaded (no sunflecks present on individual leaves) or in deep enough shade that transpiration truly is minimal.

Some researchers feel that stem water potential is a better measure of vine water status than leaf water potential since it somewhat minimizes the effects of the environment on an exposed leaf as outlined above.

However, Dr. Merilark Padgett-Johnson and I have demonstrated (unpublished data) that pre-dawn leaf, midday leaf, and midday stem water potential of *Vitis vinifera* cultivars and different *Vitis spp.* are all highly correlated with one another and with other measures of vine water status. Based on these findings, midday leaf water potential is an appropriate and convenient means of estimating vine water status, however, one must follow precisely the techniques outlined above.

It is interesting to note that D.A. Goldhamer and E. Fereres found that a major source of variation in determining tree water status (stem and shaded leaf water potential) is due to operator error.[1] Thus, whoever is taking your vine water status measurements, whether midday leaf or stem water potentials, should be cognizant of possible errors associated with their technique.

My research indicates that the midday leaf water potential of vines that are irrigated at 100% of water use is generally never more negative than –10 bars (equivalent to a stem water potential value of –7.5 bars).[7] Measurements are made one-half hour on either side of solar noon, that is 1 PM PDT.

In my current irrigation experiments, I generally do not initiate the application of water until midday leaf water potential is at or more negative than –10 bars.

At present, many growers and vineyard consultants do not begin irrigation of white wine cultivars until a midday leaf water potential value of –10 bars has been reached or a –12 bar value for red wine cultivars. The date during the growing season these values are obtained is dependent upon rooting depth of the vines, soil texture, soil moisture content, vine canopy size, row spacing, trellis type, and evaporative demand.

For example, in 2001, leaf water potential of Thompson Seedless grapevines at the Kearney Ag Center did not reach –10 bars until bloom (the first week of May), at which time irrigations began.

In a Cabernet Sauvignon trial near Oakville in 2001, irrigation was not ini-

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tiated in a trellis and irrigation study until a midday leaf water potential value of –11 bars was measured. Accordingly, irrigation was initiated on June 3, June 11, and July 10 for a VSP trellis (1m X 1m planting), a Wye (or lyre) trellis with 9-ft. row spacing, and a VSP trellis with 9-ft. row spacing, respectively.

Since soil type and rooting depth were the same for all trellises in the trial near Oakville, the differences in the date irrigations began (*i.e.* when leaf water potential reached –11.0 bars at midday) were due to the differing amounts of water used by each. Hence the rate water was depleted from the soil profile.

How much water to apply

I have spent the last 10 years determining irrigation requirements for raisin, table grape, and wine grape vineyards in all major grape-growing regions of California.

Regardless of grape type, in my opinion, once the decision to begin irrigations is made, vine water requirements are dependent upon evaporative demand at the location of the vineyard, stage of vine development, and percent ground cover by the vine's canopy. This is because the amount of water depleted from the soil profile has been significantly reduced by that time (especially if no water had been applied from the time of budbreak to that point) and the majority of the water a vine subsequently will use is dependent upon what is applied.

The information needed to schedule irrigations at daily, weekly, or other intervals throughout the growing season includes potential evapotranspiration (ET_o) and reliable crop coefficients (k_c). Potential ET (also known as reference ET) is the water used per unit time by a short green crop completely shading the ground. Ideally, the crop is of uniform height and never water-stressed.

Potential ET (ET_o)

ET_o is a measure of the evaporative demand of a particular geographic region throughout the year. Current (or near-real time) ET_o data are available from the California Irrigation Management Information System (CIMIS) which is operated by the California Department of Water Resources.

There are more than 90 weather stations located around the state where environmental data are collected to calculate ET_o.

Environmental variables measured to calculate ET_o are mean, hourly solar radiation, air temperature, vapor pressure, and wind speed. These variables are then used to calculate other variables such as net radiation and vapor pressure deficit which are then inserted into an equation to calculate ET_o.[4]

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Potential ET may also be obtained from weather stations operated by other entities (such as stations operated by the Paso Robles Vintners & Growers Association in the Paso Robles region).

Potential ET will vary seasonally and is low at the beginning of the season, highest in mid-summer, and then decreasing thereafter. Between budbreak and the end of October, ET_o can range from 35 to 50 inches of water in the coastal valleys of California.

For example, ET_o from March through October in 1997 for the Carneros region of Napa Valley, Greenfield in the Salinas Valley, Paso Robles, and Fresno were 44, 44, 51, and 48 inches, respectively.

Historical ET_o in the Santa Maria region for the above-mentioned months is estimated to be 36 inches. Therefore, if identical vineyards (same cultivar, trellis system, row spacing, canopy size, etc.) were growing at all five locations, then seasonal vine water use would be lowest in Santa Maria and highest in Paso Robles. The differences would be due to varying evaporative demand at those locations.

Crop coefficients

The next piece of information needed to determine vineyard water use is seasonal crop coefficients (k_c). The k_c is the fraction of water a non-water-stressed crop uses in relation to that of ET_o:

$$k_c = ET_c \div ET_o$$

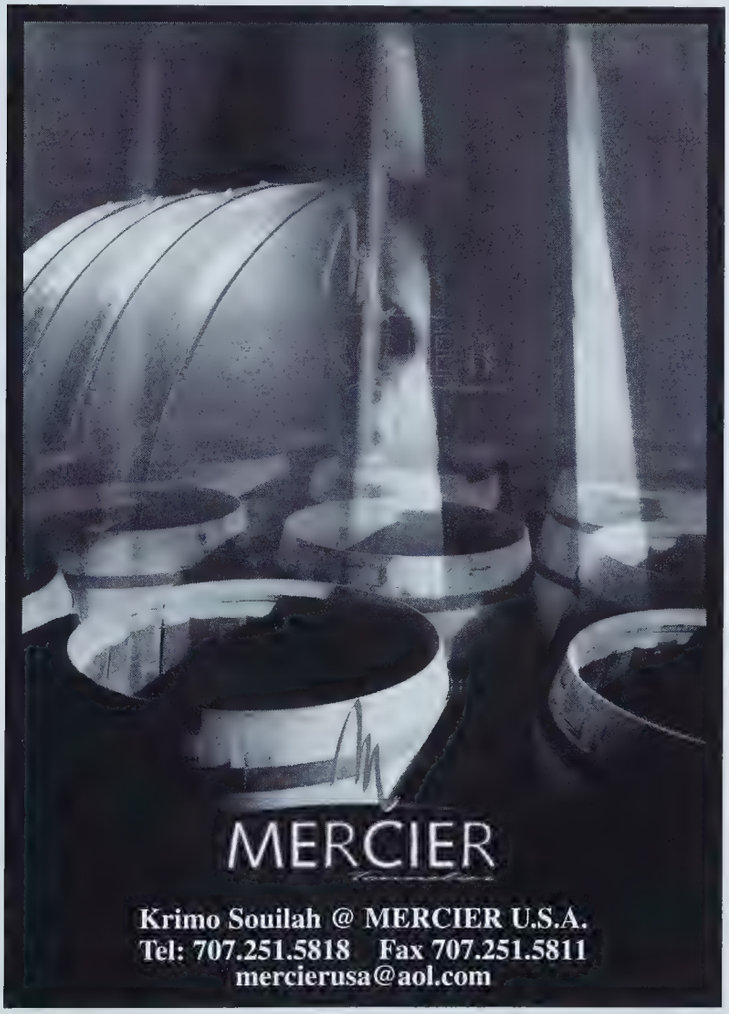
where ET_c is crop ET. The k_c is dependent upon the stage of vine growth, degree of ground cover (shading), height, and canopy resistance (regulation by the vine or crop). The k_c will vary throughout the growing season; it is not a constant fraction of ET_o. It is low early on and then as the canopy develops, it will increase (Table I).

In the past, seasonal crop coefficients have been developed for vineyards in the San Joaquin Valley. Unfortunately, when these seasonal crop coefficients were utilized in coastal valley vineyards, they did not work very well.

Various means of adapting these crop coefficients to different trellises and row spacings have included the use of another coefficient (canopy coefficient) that is a function of canopy size.

In order to develop crop coefficients, one must be able to measure or estimate grapevine water use throughout the growing season. With the aid of a weighing lysimeter, I have determined seasonal crop coefficients for Thompson Seedless grapevines grown at the University of California's Kearney Agricultural Center.[3, 6]

A weighing lysimeter is a sensitive piece of equipment that is able to measure ET of plants on an hourly, daily, and seasonal basis.



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The lysimeter at the Kearney Ag Center is comprised of a large soil container (2m wide, 4m long, and 2m deep) that sits upon a scale. The soil surface of the container is at the same level as the soil level of the vineyard surrounding it. Therefore, the soil container and scale are below ground.

Two grapevines were planted in the lysimeter in 1986. Vines were also planted around the lysimeter with vine and row spacings of approximately 7½ and 11¼ ft, respectively. The trellis system used for the vines is a two-foot crossarm approximately five feet above the soil surface. The scale has a resolution of 0.2 mm of water, which is less than 0.5 lbs.

As water is lost from the tank, either by evaporation from the soil or transpiration from the vines, a datalogger records the loss in weight (*i.e.* it measures ET_c) hourly. The vines within the lysimeter are automatically irrigated whenever they use 2 mm of water (slightly more than two gallons) and are therefore assumed not to be under water stress.

Water use of the vines in the lysimeter, between budbreak and the end of October, from four years after planting until the present, has ranged from 29 to 34 inches (approximately 1,400 to 1,700 gallons per vine).[6] Potential ET at the same location over the same years has ranged from 42 to 47 inches. Daily water use of vines growing within the lysimeter will average 10 to 12 gallons at maximum canopy, mid-summer.

During the 1998 and 1999 growing seasons, a study was conducted to determine the relationship between leaf area of the vines in the lysimeter, shaded area cast on the ground at solar noon, and grapevine water use. Thus, leaf area was estimated and shaded area on the ground was determined at various times throughout the growing season.

The study found that, at full canopy, shaded area on the ground comprised approximately 50% of the total land area allocated per vine within the vineyard.

In 1999, the shoots of the two vines growing within the lysimeter were allowed to grow across the row middles on either side of the lysimeter. The shaded ground area just prior to that time was about 60%. A support system was then constructed to raise the shoots (simulating an overhead trellis system) and the percent ground cover increased to approximately 75%.

Actual vine water use prior to raising the canopy was 12.7 gallons per day, and after raising the canopy, it increased to 16.7 gallons per day. This indicates that it was the orientation of the canopy (determined by the trellis system) and not the total leaf area per vine that dictated how much water the vine used, if the vine was not water-stressed.

It was also found that vine water use (ET_c) and the crop coefficient were linear functions of the amount of shade measured beneath the vines at solar noon. The equation to describe the relationship between the crop coefficient (k_c) and percent shaded area was: $k_c = 0.002 + 0.017x$, where x is percent shaded area.

A linear relationship between the crop coefficient and light interception (or shaded area), with a slope similar to that of the grapevines, has also been found by Dr. Scott Johnson for peach trees growing in a weighing lysimeter at the Kearney Ag Center.

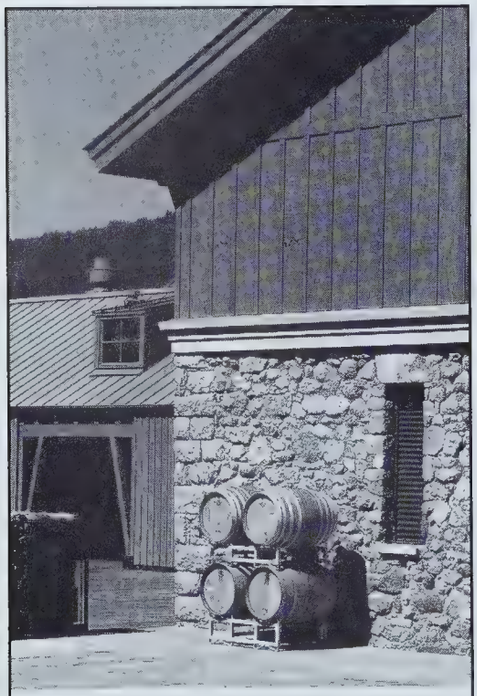
There are several reasons why grapevine water use and the crop coefficients may be related to the percentage of shaded area when measured at midday:

1) The driving force of ET, net radiation, is greatest between 11 AM and 2 PM.

2) Approximately 75% of the daily water use by vines growing in the lysimeter occurs between 10 AM and 2 PM.

3) The shade beneath a vine is an indirect measure of how much solar radiation the vine is intercepting.

4) The shade beneath the vines varies only slightly between 9 AM and 3 PM for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east/west rows (row direction in the lysimeter vineyard).
5) As the season progresses, the vine's canopy gets larger, resulting in more light being intercepted (more shaded area on the ground) and greater water use.

Impact of trellis and row spacing

There are numerous trellis systems used for winegrape production in California today. There are systems in which little management is used (sprawl systems) and those, which are highly manipulated. The latter systems include the VSP (vertical shoot positioned trellis) and vertically divided canopies such as the Scott Henry or Smart/Dyson trellises. Horizontally divided canopy trellis systems include the lyre, U and Wye trellises, and the GDC (Geneva Double Curtain).

Any of the above winegrape trellis systems that increase the percent ground cover should also increase vineyard irrigation requirements based upon observations using Thompson Seedless grapevines in the lysimeter.

In addition, as the tractor-row width decreases, the percent ground cover or shaded area will increase. One would therefore assume that vineyard water use would increase as the distance between rows decreased.

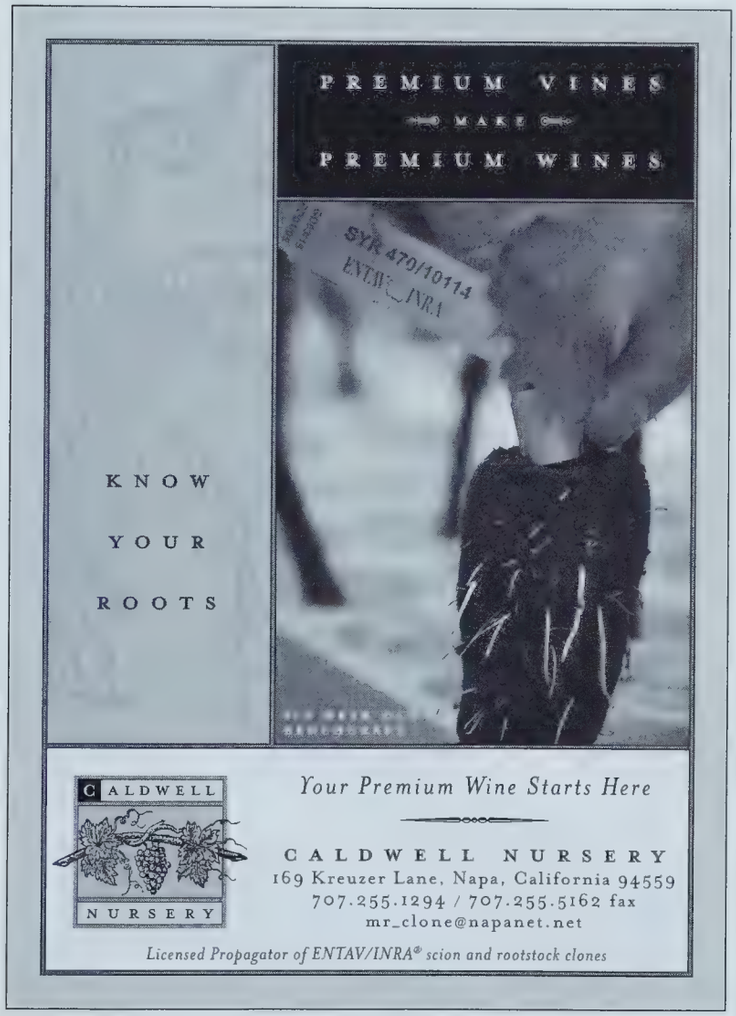
I have independently developed crop coefficients for two different training/trellis systems: a VSP trellis with unilateral cordons and a modified GDC trellis with quadrilateral cordons trained to a four-foot crossarm. In order to develop k_cs for both systems, water was applied at various fractions of my initial estimate of ET_c for each trellis system. This was replicated in trials in two commercial vineyards.

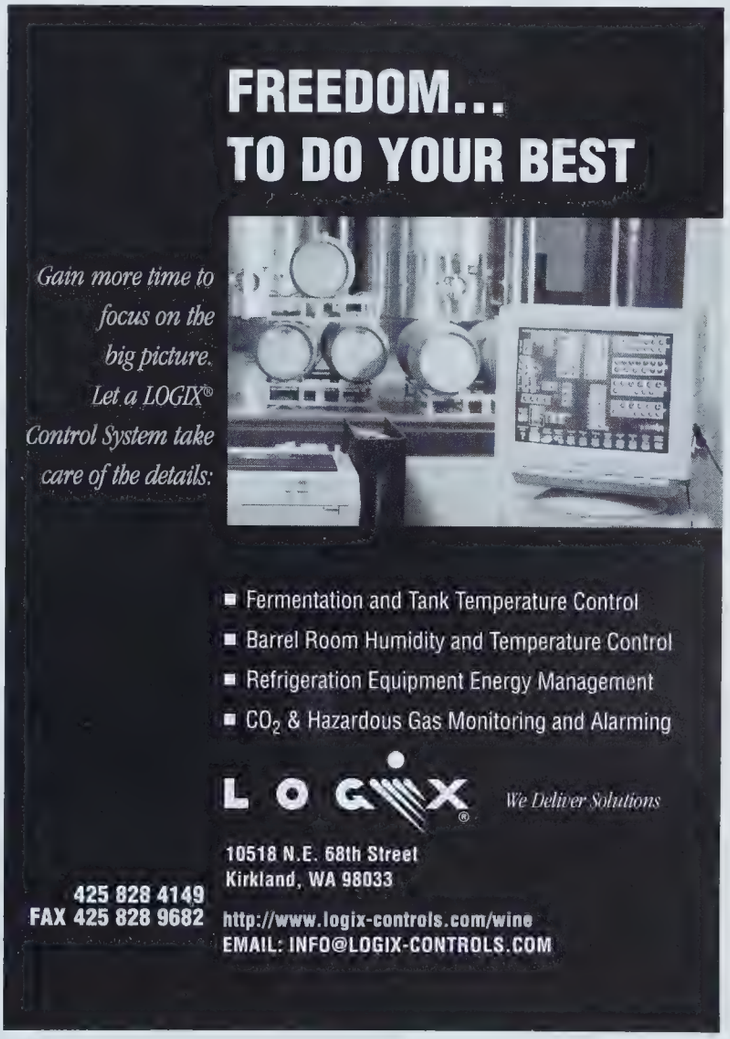
The fractions of ET_c used were 0.25 to 1.25 ET_c in increments of 0.25. The VSP-trellised vineyard was in Carneros and had a seven-foot row spacing and the quad-cordon vineyard in Temecula had a 12-foot row spacing.

A vine water balance was then determined for each irrigation treatment. Water inputs from rainfall and irrigation and the soil water content in each irrigation plot were measured.

Based upon my work at the Kearney Ag Center, if vines are irrigated at full ET, soil water content will remain fairly constant. If vines are being deficit-irrigated, then soil water content will decrease. In addition, my previous work with Thompson Seedless indicated that midday leaf water potential generally would not be more negative than –10 bars if vines were irrigated at 100% of ET_c.

These were the two main criteria used to determine if vines were receiving applied water amounts that replaced water used by the vines on a

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weekly basis. Once it was determined which irrigation treatment (applied water amount) was equivalent to vine ET_c, I was able to calculate how much water the vines used at regular intervals throughout the growing season and then to calculate seasonal crop coefficients.

The maximum k_c for the vines on a VSP trellis system, in a vineyard with a seven-foot wide tractor row, was slightly greater than 0.7 (Table I). The maximum k_c for the modified GDC trellis (12-foot wide tractor row) was approximately 0.75 (Table II). Both of the above values are less than that found for Thompson Seedless grapevines in the lysimeter where the maximum k_c can be close to 1.0.[3]

The VSP trellis seasonal crop coefficients initially developed on the seven-foot wide row spacing have been tested in other commercial vineyards with different row spacings, row directions, cultivars and rootstocks, and at four different locations. At all locations, irrigation treatments at various amounts of estimated full ET_c were included in a replicated trial.

The seasonal VSP trellis crop coefficients were adjusted either upward or downward for narrower or wider row spacings, respectively, from those developed in Carneros.

For example, the seasonal k_cs for a six-foot row spacing were increased by 1.17, relative to those developed in Carneros on a seven-foot row spacing (7 ft ÷ 6 ft = 1.17) while those for a 10-foot row spacing were decreased by 0.7 (7 ft ÷ 10 ft = 0.7) relative to those developed in Carneros (Table I). Therefore, the maximum k_c for VSP vineyards with tractor row widths of six feet, eight feet, nine feet, and 10 feet, were calculated to be 0.82, 0.62, 0.55, and 0.49, respectively (Table I).

Crop coefficients developed for the VSP trellis will increase or decrease water use per unit land area as row spacing decreases or increases. However, if vine spacing within the row is the same among those vineyards, then water use per vine will remain the same. An example of this can be found in Table II. The water use per unit land area (ET_c in inches column), comparing a VSP trellis at six- and nine-foot row spacings is greater for the six-foot row vineyard but water use per vine (last column) is the same for both.

In order to validate my assumptions about row spacings and crop coefficients used, the crop coefficient was considered appropriate (*i.e.* applied water amounts replaced what the vines used) if midday leaf water potential remained above –10 bars all season and if berry weight was maximized at applied water amounts at 75% of estimated full ET_c (*i.e.*, applied water amounts at greater values did not result in a further significant increase

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in berry size.) These parameters were based upon data collected on Thompson Seedless in San Joaquin Valley.

At various points during the 1998 and 1999 growing seasons, shaded areas under vines at all trial sites with VSP trellises, were measured at solar noon.

This was done by placing a four-foot by four-foot piece of plywood, on which a grid (six-inch by six-inch squares) had been drawn on the ground beneath the vines and either visually estimating the percent shade in each square of the grid or by recording an image of the plywood with a digital camera. The image was downloaded to a computer and the shaded area was determined with appropriate software.

Crop coefficients used to schedule irrigations that week in each vineyard were compared with the crop coefficient calculated as a function of shaded area measured that particular week. The equation used was: $k_c = 0.017$ x percent shaded area, where 0.017 is the slope of the equation describing the relationship between the percent shaded area and the crop coefficient of Thompson Seedless vines growing in the weighing lysimeter.

The data indicated that the k_c calculated from percent shaded area and the k_c being used that week to schedule irrigations were linearly correlated with one another (coefficient of determination [r^2] was 0.86). This also implies that the use of the shaded area technique to calculate a crop coefficient could be a viable tool in vineyard irrigation management to approximate the value of potential vine water use at full ET_c.

In the 2000 growing season, crop coefficients were developed for vineyards using a lyre trellis and a high-density VSP-trellised vineyard (the latter planted 1m x 1m; 4,049 vines per acre), using the shaded area technique.

The calculated k_c at maximum canopy development (*i.e.* late in the summer) was 0.83 for the lyre (planted to nine-foot wide tractor rows) and 0.91 for the 1m x 1m planting (Table II).

Results indicate that trellises such as the lyre, which spread the canopy, will have higher per vine and per unit land area water requirements than trellises that don't (such as the VSP), when both are planted to with same tractor row width.

However, when there is a VSP trellis in a vineyard with a closer row spacing (such as a six-foot vine row spacing or 1m x 1m planting), water use per unit land area of those vineyards may be comparable to the lyre planted on nine-foot or wider row spacing. This illustrates that both trellis (or canopy type) and row spacing will determine percent ground cover in the vineyard and ultimately potential vineyard water use.

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Also during the 2000 growing season, the shaded area was measured beneath vines on vertically split canopies (such as the Scott Henry and Smart/Dyson systems) to derive their crop coefficients. Vineyards in which these systems were used included row directions east/west and north/south.

Shaded area measurements taken at solar noon on a vertically-split trellis planted to north/south rows were not similar to those planted to east/west rows.

I subsequently determined that the shaded area of a vertically split canopy planted to north/south rows measured an hour before or an hour after solar noon was very similar to the shaded area of rows oriented east/west when measured at solar noon.

I also have found that crop coefficients developed on east/west rows were appropriate for north/south rows for both VSP trellises and vertically-split canopies.

The water requirement of a vertically-split canopy is approximately 25% greater than that of a VSP canopy, when planted on the same row spacing when the calculations are made after veraison (Data was generated during the 2001 growing season).

Practical use of measuring shaded area in your vineyard

As shown above, the shaded area beneath vines in your vineyard can be determined by several methods. One can use a grid and then estimate the amount of shade within each grid, then calculate the total shaded area of the vine. The same grid can be used to produce images of the shade on plywood with a digital camera.

There are software packages that allow calculation of areas of different colors on the image. However, the digital camera cannot be used if the vine's canopy extends to the soil surface. Lastly, one can use a tape measure to determine the average width of the shade beneath the grapevine and then calculate the total shaded area. This can be done where the canopy within the vineyard is highly uniform.

It should be noted that determining the shaded area of canopies early in the growing season or in newly planted vineyards is difficult with a measuring tape since such canopies are very discontinuous. It would be hard to get an average width of the shaded area.

However, if one can obtain a good approximation of the amount of shade under the vine, then estimation of a crop coefficient would prove useful in determining the amount of water a vine would use at 100% of vineyard ET.

Below is an example of how potential vineyard water use could be derived using percent shaded area to estimate the crop coefficient:

A. Tractor row width = 10 feet
B. Vine spacing = 6 feet
C. Area per vine = 60 ft^2
D. Average width of measured shaded area between two vines = 3 feet
E. Shaded area per vine = B x D = 6 ft. x 3 ft. = 18 ft^2
F. Percent shaded area = E ÷ C = 18 ft^2 ÷ 60 ft^2 = 0.3 or 30%
G. Crop coefficient (k_c) = F x 0.017 (slope of relationship between k_c and percent shaded area of Thompson Seedless) = 30 x 0.017 = 0.51
H. Vine water use = ET_o (obtained from CIMIS) x k_c.

Irrigation scheduling

To determine a vineyard's irrigation requirement, the equation in H above can be used ($ET_c = ET_o \times k_c$). Remember this equation is for calculating applied water volumes that replace amounts of water the vineyard uses daily or at other intervals. That is, the soil's water reservoir would not be depleted. The above equation will give full crop water use in mm or inches.

To determine water application amounts per vine or to calculate pump run times, one must convert mm or inches into liters or gallons. The metric conversion is one mm covering one hectare equals 10,000 liters. The English conversion is one inch covering one acre equals approximately 27,500 gallons.

Once the amounts have been determined, divide the liters or gallons required per unit land area by number

Table III — Calculated water use of Cabernet Sauvignon grapevines in Paso Robles during the 2000-growing season. Potential ET (ET_o) was obtained from the Paso Robles Vintners and Growers Association's PR1 weather station. Row spacing was 10 ft. and vine spacing was 6 ft. (726 vines per acre). It was assumed that there were 27,500 gallons per acre-inch.

Month	Week	ET_o (in.)	K_c	ET_c (in.)	ET_c (gal./acre)	ET_c (gal./vine)	Rain (in.)
May	1	1.38	0.14	0.19	5,225	7.2	0
*	8	1.38	0.17	0.23	6,325	8.7	0
	15	1.50	0.18	0.27	7,425	10.2	0
**	22	1.69	0.22	0.37	10,175	14.0	0
	29	1.89	0.25	0.47	12,925	17.8	0
June	5	1.61	0.28	0.45	12,375	17.0	0.2
	12	1.73	0.32	0.55	15,125	20.8	0
	19	1.69	0.36	0.61	16,775	23.1	0
	26	1.97	0.39	0.77	21,175	29.0	0
July	3	1.57	0.41	0.64	17,600	24.2	0
	10	1.61	0.43	0.69	18,975	26.1	0
	17	1.97	0.44	0.87	21,450	29.5	0
***	24	2.05	0.44	0.90	24,750	34.1	0
	31	2.05	0.45	0.92	25,300	34.8	0
August	7	1.89	0.46	0.87	23,925	33.0	0
	14	2.05	0.47	0.97	26,675	36.7	0
	21	1.73	0.48	0.83	22,825	31.4	0
	28	1.26	0.49	0.62	17,050	23.5	0

*, **, and *** denote dates of the initiation of irrigation, approximate date of bloom, and approximate date of veraison, respectively. Vines were harvested September 27, 2000.

of vines per hectare or acre (Tables II and III). The pump run time is also dependent upon the number and sizes of emitters per vine and the irrigation system's emission uniformity.

The seasonal progression of vine water use for a VSP trellis, planted with 10 foot-wide tractor rows is shown in Table III. The data illustrate how vine water use is lower early in the season due to a smaller canopy.

Once the canopy is established and fills the trellis (beginning the middle of July), differences in ET_o from week to week, will result in differences in vine water requirements when this technique to irrigate vines is used. Thus, the benefits of calculating vine water use with this method is that both evaporative demand (ET_o) and the seasonal progression of a canopy's development or trellis type and tractor row spacing dictate how much water to apply.

The following illustrates how seasonal vineyard water use of one trellis system may vary as functions of row spacing and of different trellis systems at the same location.

The calculated vineyard water use between budbreak (April 3) and harvest (September 21) in 2000 for a Cabernet Sauvignon vineyard, using a VSP trellis and a six-foot tractor row near Oakville in Napa Valley, was 17.7 inches and applied water was 89% of that value. Potential ET for the same timeframe was 34.4 inches.

The calculated water use for a similar vineyard but with tractor row widths of 7, 8, 9, and 10 feet would have been 15.2, 13.3, 11.8, and 10.6 inches, respectively. Calculated water use for a lyre trellis, with 9-foot row spacing, and a 1m x 1m planting at the same location would have been approximately 20 inches and 25 inches of water, respectively.

Effect of water amounts on growth and yield

Research conducted in my laboratory and elsewhere, indicates that deficit-irrigation will have minimal effects on berry growth or yield and with possible advancement in date of harvest and an increase in fruit quality.

In each of my irrigation trials, irrigation amounts that are fractions of estimated full ET have been included. These amounts are applied from the first irrigation of the season up until at least harvest or beyond. This allows determination of the effects of both under- and over-irrigation on vine growth, berry characteristics, and yield of raisin and table grapes or wine quality of wine grape cultivars.

I have found that irrigation amounts, at approximately 80% of full ET, maximize berry size for raisin and table grapes.[6] Yield of Thompson Seedless vines grown at the Kearney Ag Center is

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Table IV — Relative berry weight as a function of applied irrigation amounts (fraction of estimated full ET) at four locations and two cultivars, Cabernet Sauvignon and Chardonnay. All vineyards used a VSP trellis. Values at each location are the mean of three different rootstocks except at Paso Robles, which had five rootstocks, with data collected for a minimum of three growing seasons.

Location	Cultivar	Irrigation Treatment (fraction of estimated ET_c) 0.25	0.5	0.75	1.0	1.25
		—— (percent of maximum weight)* ——				
Oakville	Cabernet	83	93	98	100	98
Paso Robles	Cabernet	78	88	95	98	100
Gonzales	Chardonnay	77	89	96	98	100
Edna Valley	Chardonnay	82	89	97	99	100

* The weights of each treatment were divided by the treatment with the greatest weight. The treatment with the greatest weight was set to 100%.

Table V — Relative yield as a function of applied irrigation amounts (fraction of estimated full ET) at four locations and two cultivars, Cabernet Sauvignon and Chardonnay. All vineyards used a VSP trellis. Values at each location are the mean of three different rootstocks except at Paso Robles, which had five rootstocks, with data collected for a minimum of three growing seasons.

Location	Cultivar	Irrigation Treatment (fraction of estimated ET_c) 0.25	0.5	0.75	1.0	1.25
		—— (percent of maximum weight)* ——				
Oakville	Cabernet	77	96	100	99	99
Paso Robles	Cabernet	61	70	81	91	100
Gonzales	Chardonnay	65	81	87	89	100
Edna Valley	Chardonnay	92	90	92	98	100

* The weights of each treatment were divided by the treatment with the greatest weight. The treatment with the greatest weight was set to 100%.

Table VI — Relative pruning weight as a function of applied irrigation amounts (fraction of estimated full ET) at four locations and two cultivars, Cabernet Sauvignon and Chardonnay. All vineyards used a VSP trellis. Values at each location are the mean of three different rootstocks except at Paso Robles, which had five rootstocks, with data collected for a minimum of three growing seasons.

Location	Cultivar	Irrigation Treatment (fraction of estimated ET_c) 0.25	0.5	0.75	1.0	1.25
		—— (percent of maximum weight)* ——				
Oakville	Cabernet	85	89	100	96	99
Paso Robles	Cabernet	61	67	79	88	100
Gonzales	Chardonnay	75	81	87	96	100
Edna Valley	Chardonnay	87	87	92	98	100

* The weights of each treatment were divided by the treatment with the greatest weight. The treatment with the greatest weight was set to 100%.

maximized at applied water amounts that are 80% of lysimeter water use whether used for raisin[5,6] or table grape production (unpublished data).

It has been found that the yield of Thompson Seedless grapevines used for raisin production actually decreases when applied water is greater than 100% of ET, determined with the weighing lysimeter. This is due to reduced bud fruitfulness and lower cluster numbers per vine.

Vegetative growth of Thompson Seedless vines generally increases as applied water increases from no irrigation to 120% of ET.[5,6]

My studies in various table grape vineyards, in both the Coachella and San Joaquin Valleys (over a four-year period), have demonstrated that packable yields may be only slightly reduced at applied water amounts equal to 50% of full ET.

It should be noted that the above results were obtained in vineyards that were irrigated daily. Therefore, the irrigation frequency used in those studies may have mitigated possible negative effects of deficit irrigation.

My studies in Chardonnay and Cabernet Sauvignon vineyards in Napa Valley and along the central coast of California have somewhat mimicked results found with Thompson Seedless vines. In these studies, irrigation frequency is only once or twice per week. Berry size is usually maximized with applied water amounts at 75% of estimated full ET (Table IV). Yields are slightly diminished at applied water amounts at 75% of full ET (Table V).

Yields have been maximized, in some instances, at applied water amounts equal to 50% of full ET, but this is dependent upon weather (years in which rainfall may have occurred late into the spring), location, soil type, and rooting depth. Pruning weights, a measure of vegetative growth, generally increased as applied water amounts increased (Table VI).

My wine grape studies have also addressed the effect of rootstock on vine water use. At least three rootstocks were used at each site (five in Paso Robles) and these included 5C, 110R, 3309C, Freedom, 140R, and 1103P.

I have found no differences in vine water use or vine water relations among individual rootstocks at a specific location. This may be due to the fact that all vineyards utilized the VSP trellis system. Shoot hedging and positioning, as performed for the VSP trellis, does not allow possible differences in vine vigor (increased canopy size) among rootstocks to be expressed. In addition, drip irrigation may limit exploration of the soil profile by each rootstock.

While, I have rarely found significant interactions between rootstocks and irrigation amounts among the different fruit and yield parameters measured at each site, I have found significant differences in those parameters among rootstocks.

Small wine lots have been made of Cabernet Sauvignon grown at Oakville and Paso Robles and Chardonnay from Carneros with sensory analysis performed on each. While deficit irrigation will increase color of wine made from Cabernet Sauvignon, there has been no consensus as to preferences among the irrigation treatments.

One possible reason is that irrigation amounts that I calculate as full ET_c for the VSP trellis are much less than previously thought. For example, calculated ET_c for the Paso Robles Cabernet Sauvignon vineyard (with 10-foot wide tractor rows) from budbreak to the end of September has only been between 10 to 12 inches per growing season. This is much less water than many growers presently apply.

Conclusions

Information regarding the use of a pressure chamber and estimation of crop coefficients presented above can provide growers an objective means in determining when irrigations should commence, while also helping them estimate how much water a vine potentially may use at full ET_c.

I have used both the pressure chamber and measured soil moisture content with a neutron probe in studies to determine when irrigations should commence. Both have worked extremely well.

However, the measurement of a vine's leaf (or stem) water potential may be preferable, since it integrates the amount of water the vine's roots have access to throughout the soil's profile. In addition, measurements of leaf water potential can be made at more than one site within the vineyard with relative ease.

Many times, determination of a vineyard's soil water status with a neutron probe in a commercial situation is based upon just one access tube per vineyard. Placement of this single assess tube in the vine row, including distance from an emitter (if drip irrigation is used), may not accurately determine soil water status of an individual vine nor account for variability within the vineyard due to different soil types and/or rooting depths.

Calculation of irrigation requirements using crop coefficients and ET_o, provides an objective means to determine how much water should be applied based upon the vine's growth characteristics, trellis, and row spacing. It is also reflective of changes in evaporative demand from day to day during the growing season and from year to year.

For example, if evaporative demand is high one week, irrigation requirements will be high, if it is lower the next week, then irrigation requirements will be lower.

Initiating vineyard irrigation later in the growing season or the use of deficit irrigation may restrict excess vegetative growth, whether for grapevines grown in the interior valley of California or along the coast. This would minimize the cost of canopy management for vines that, in the past, became too vigorous due to excessive irrigation.

Grapevines can be deficit-irrigated at various fractions of estimated full ET_c with minimal impacts on yield but with a potential to increase fruit quality. Thus, in most cases, one may not have to apply water amounts that meet or exceed estimated vineyard water use requirements presented in this article.■

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"Tech talk" out synesthesia in

BY Eleanor & Ray Heald
Contributing Editors

Whether the application is vineyard or winery, technology has driven the wine industry for over a decade. Though wine continues to be described as seductive, lately the seduction for a viticulturist and winemaker has often been new machines and new techniques. To use a line from the old song, "Is that all there is?"

Don Blackburn, winemaker at Byington Winery & Vineyard (Los Gatos, CA) doesn't think so. "As people working in the wine industry, it is helpful to remind ourselves of the basic truth about wine," he says. "Its purpose is not to supply cash flow or to meet with wine writers' approval. It is to please individual people."

He suggests further that the discussion of wine's pleasure has been concentrated on aroma and flavor profiles, which use only a minority of each person's sensory capability. People are also impacted by visual clues, such as a wine's beautiful color, but that is only another prelude to the key to a wine's success — namely, mouthfeel.

Wine's texture is more difficult to capture in a brief description. Holistic depiction of texture encourages us to search widely for adequate means of describing wine.

Such multi-sensory relationships place wine production and enjoyment smack dab in the lap of synesthesia.

What is synesthesia?

Synesthesia, defined as "joined sensation" shares a root with anesthesia, meaning "no sensation." In synesthesia, stimulation of one sense reliably causes a perception in one or more other senses. For a few rare people, for example, a musical chord has not only a sound, but a color.

Synesthesia is involuntary but elicited. It is a passive experience that is unsupressable, but is elicited by a stimulus that is usually identified without difficulty. It is memorable and cannot be conjured up or dismissed at will, although circumstances of attention and distraction may make the experience seem more or less vivid.

Its phenomenology clearly distinguishes it from metaphor, literary tropes, sound symbolism, or deliberate artistic contrivances that sometimes employ the term "synesthesia" to describe multi-sensory joinings.

Although neuroscience has been aware of synesthesia for centuries, it periodically forgets that it is known. After decades of neglect, a multidisciplinary revival of inquiry is under way. Today, neuroscience is particularly curious about what synesthesia might tell us about consciousness, the nature of reality, and the relationship between reason and emotion. In what way may synesthesia be impacting wine, its production and enjoyment?

Blackburn uses synesthesia, or trans-sensual stimulation, to describe similarities among wines that have little in common technically. "We tend to rely on numbers such as pH as an 'objective' justification for our actions," explains Blackburn. "We similarly use a semi-standard list of adjectives as a means of reducing an impression to a simple (if unidimensional) experience. In attempting to be as rigorous as our instruments, we have, as Thoreau put it, 'become the tools of our tools.'"

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Tech may be dulling the senses

Blackburn acknowledges that technology has offered the wine industry an increasingly accurate picture of the physical and chemical nature of the vineyard — not only the soil, but the environment above the ground, within the vine, and ultimately in the wine.

Technology creates a fuller understanding of the effect of man's actions on the wine's development, both in the barrel and in the bottle. As such, it is an irresistible force that can easily dominate a viticulturist's or winemaker's every action and thought.

"That's the monster," Blackburn emphasizes. "If we recognize it, we can properly tame its excesses to best suit winemaking goals and the personal satisfaction derived from our work. The monster must be seized by the throat and forced to stay on task."

He explains that the synesthesia concept was in its prime from 1850 to 1900 due to the influence of impressionism in music and art. A number of artists in that period were true synesthetes. They experienced a degree of trans-sensual perception beyond the average person.

However true, there are a lot of average people drinking wine. The majority of wine produced is aimed at this segment of the market.

"For whatever price a consumer is willing to pay for wine, it must not merely taste good or have varietal character," Blackburn says. "To be stimulating, the wine must offer a uniqueness of aroma and flavor. A consumer will want to describe it with statements such as: "The word is on the tip of my tongue, but I can't express it"; "It's not just the mouthfeel, it's something else like high and low points"; and, "That isn't it exactly; let me taste it again to see if I can tell you."

A good wine, Blackburn believes, can never be characterized in its entirety. Winemakers benefit from using a maximum of descriptive modes to help them describe wines for other people and to help conceptualize wines for their own purposes.

For Blackburn, the tool that has offered the most extensive insight is music, not technology.

Music and wine

Comparison of wine with music, Blackburn insists, has occurred for many generations, though it has seldom been discussed outside a dinner party environment. His goal is to carry this further. Due to the more practical issues of winemaking that dominate his time, he hasn't been able to explore the wine-music juncture the way he believes it deserves.

Blackburn, therefore, invites all interested parties to carve out for themselves as large a piece of the process as they choose and call it their own.

Anyone, he continues, can observe trans-sensual stimulation, but only the more acute persons can characterize the nature of the linkage in a consistent manner. The average person finds a brief and unanticipated flash of sensation in the absence of any direct stimulus. The moment may be captivating, but is soon forgotten.

In what way may synesthesia be impacting wine, its production and enjoyment?

"In the wine trade," he says, "synesthetic stimulation of even the slightest degree in the consumer has the potential to add substantially to the holistic experience of wine. Ideally, that addition should be a positive one."

Blackburn is fascinated by composers, such as Nikolai Rimsky-Korsakov and Alexander Scriabin, gifted synesthetes. He says they confidently described the colors they felt matched particular musical chords. While they differed on a number of matchings, he says they agreed on specific cases, such as linking the color blue with the chord E major, yellow with D major, and purple with A flat major.

He personally associates red with A flat major. "However," he adds, "I have not written a symphony."

Musically-stimulated synesthesia is one of a number of creative linkages. Writers have used certain catalytic stimulation for their artistic expression. This can be something as mundane as body position. Thomas Wolfe, Virginia Woolf, and Lewis Carroll all wrote standing up. Mark Twain, Robert Louis Stevenson, and Truman Capote all wrote lying down.

Voltaire also wrote lying down, but with his paper propped on the naked back of his lover. Benjamin Franklin wrote in the bathtub, as did Diane Ackerman. The final chapter of her book *The Natural History of the Senses*, covers synesthesia in depth. Blackburn says he has read it several times, principally to give him ideas about how to stimulate awareness of aromas and tastes and to discover ways in which others found aid in synesthesia.

He refers to recent research done at Yale University which suggests that the scent of rotten apples, when inhaled, can elevate a person's mood without otherwise altering consciousness. "I have not tested the rotten apples theory," he reports, "because music gives me the same result. Not just any music. Classical music, composed between the 17th and 19th centuries, because it causes a predictable reaction. It has withstood the test of time."

Synesthesia, wine, and music

Being very left brain oriented and coming from a scientific background, the authors of this article belong to the "show me" school. Since wine pairs so well with food as a pleasure process, Blackburn uses a lunch setting as a backdrop for having us discover for ourselves the nuances of synesthesia, wine, and music.

"Physics and metaphysics are balanced with wine," Blackburn maintains. "Wine is symbolic of an attempt by people to get back to their psychic roots. People desire to be seduced by wine, therefore the mouthfeel of a wine is most important.

"The experience of wine is difficult to describe. It doesn't really matter whether it smells like peaches or apricots. The most important element is whether the wine is balanced; whether it's awkward or elegant — and that's hard to put into words. But it is sensed."

He serves a Chardonnay without music playing in the background. Nice wine. All those terms, tropical fruit, lemon-citrus, flood our brains. With "Stabat Mater" by Giovanni Battista Pergolese from the original soundtrack of the film *Amadeus* playing in the background, an immediate impression of the wine is created. We know instantly whether we like the wine or not, whether it is in balance, and we are sensorially directed to discover nuances.

"Sure, we can continue to use terms such as lemony and buttery," Blackburn notes, "but I suggest we get consumers to

the big picture; that's whether the wine has charm, nuances, and layers of interest."

Getting the big picture

Blackburn serves the 1998 Byington Viognier, Santa Cruz County, and plays Rossini Respighi's "La Boutique Fantastique," best described as ballet music.

We're attracted to the Viognier. We do not immediately focus on honeysuckle, mandarin orange, or other descriptors for the wine. We look at the big picture: round, creamy texture, and the overall pleasure it offers.

While the same musical piece plays, Blackburn pours the 1998 Byington Chardonnay, Santa Cruz Mountains. Something clashes. The music is too light-hearted and frivolous for this wine. It sends it in a juvenile direction, even though there is a sound core to be discovered and savored.

The music changes to Mozart's Symphony No. 40. "Try the Viognier again," Blackburn instructs. We dislike it — and not because our palate was distracted by the Chardonnay. The music is definitely impacting us sensorially, synesthetically, and affecting our impression of the wine.

Mozart's "Requiem Dies Irae" sequence makes a Bordeaux wine impression bigger, bolder, and somewhat out of balance. Haydn's "Maria Theresa Symphony No. 48 in C Major" smooths out the wine's youthful, rough-edged impression and makes it more enjoyable overall.

Making applications

Does the music change our mood and thus influence our perception of the wine? It seems that it does.

Blackburn says that when he says to himself in a blending session, "I want to make a wine that tastes like..." he plays an appropriate classical selection. He knows whether it's the correct one in a short time. He selects another and another, perhaps, until his senses are piqued and focused on balance and harmony in the wine — that big picture.

Could selecting the appropriate music to be played in a tasting room have an impact on the way wine is perceived? Recall, Blackburn invited all interested parties to carve out for themselves as large a piece of the process as they choose to call their own.

Music and wine. Internal and external stimuli. These relations are being analyzed around the wine world. In a recent visit to the ecologically-sensitive cellars of Alois Lageder in Magrè, Italy (Alto Adige), we discovered an ongoing experiment studying the effect of music on wine ageing in cooperage.

Proprietor Alois Lageder is attempting to show a relationship between what's occurring outside and inside the winery. Wind currents in the Alto Adige valley are significant, and a windmill atop the winery activates a generator which activates a high-tech "stretch" of a musical composition and also runs a light show in the barrel ageing cellar.

Lageder declines to explain any relation to traditional science because he can't. He only says he has seen an improvement in the way his red wines are developing under the influence of wind, music, and light.

New winemaking tool

Is synesthetic matching a new winemaking tool? "I don't believe that an absolute link exists between a given wine and a given piece of music," Blackburn concludes. "I consider any linkage to be relative, but it is, in my opinion, correct to say that any wine-music pairing is more or less valid, depending on other pairings which are rejected.

"As a winemaker, I believe a musical piece can be used to facilitate conceptualization of an as-yet-non-existant wine. If the correct musical composition is chosen, it can enhance a consumer's impression of the wine. We need to better use all our senses to create a fuller enjoyment of wine."

Perhaps some *PWV* readers will view this wine-music synesthetic juncture as a cult classic "Harold and Maude" film parallel, creating a fleeting, even crazy romance between unlikely soulmates. There's an old adage that may apply, "Don't knock it until you've tried it." ■

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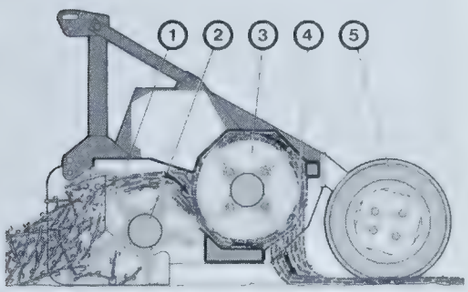
tel: 800/426-9124
website: www.stalabs.com

Ferrari Tractor CIE

Ferrari Tractor CIE's new Vine Branch Shredder has an aggressive, gear-driven, pick-up reel that rakes up prunings from even the roughest surfaces and delivers them to an elevated shredding chamber.

A hammer-equipped rotor turning at high speeds and surrounded by a perforated steel grate reduces woody material to a fine pulp that passes outward through holes in the grate system. This uniformly fine pulp is quickly decomposed and incorporated into the soil. Deconstruction of woody stems exposes pests and their egg cases to oxidation and soil microorganisms that destroy them.



A large throat permits even heavy pruning residues to feed quickly into the Vine Branch Shredder. The pick-up tines mounted on their own powered rotor are staggered laterally so they do not pick up rocks, increasing the life of the machine. Large rear wheels increase stability, reducing side sway and allow you to work close to vines. On steep ground, the tractor is relieved of some of its load.

The Vine Branch Shredder is available in overall widths of 44, 54, 63, and 74 inches, making it ideal for high-density plantings.

For more information, contact:
Ferrari Tractor CIE
PO Box 1045, Gridley, CA 95948
tel: 530/846-6401; fax: 530/846-0390
website: www.ferrari-tractors.com

Sutton Ag Enterprises, Inc.

Birds cause extensive damage every year. This depredation may range from crop losses to health and safety hazards, but is especially prevalent in ripening grapes. By using a combination of Sutton Ag's bird control products, it is possible to minimize or completely control these losses.

The key to any pest control program is variety — employing different methods, alternating the duration or time of day used, relocating the devices, etc. Sutton Ag's bird control products can significantly reduce damage caused by pest birds and protect your investment.

Sutton Ag is the exclusive distributor of Bird Bombs®, Bird Whistlers®, and Zon Propane Cannons in the U.S and carries a wide variety of sonic and visual devices including: Bird Gard distress cries, Bird Baffler™ Reflective Tapes, Rainbow™ Tape, Bird Baffler™ Revolution, etc.

Sutton Ag also specializes in premium and disposable-grade Bird Control Netting (available in full rolls or cut to order) to completely exclude your crop from pest birds.

For your seasonal problems, Sutton Ag offers a rental program for Propane Cannons and Bird Gard Super Pro.

For more information, contact:
Sutton Ag Enterprises, Inc.
Diane de Lorimier
746 Vertin Ave., Salinas, CA 93901
tel: 831/422-9693
fax: 800/482-4240 or 831/422-4201
e-mail: suttonag@earthlink.net

CAL-PAC

CAL-PAC, an international company, has been in the vineyard- and orchard-design business for over 20 years and can assist you in development of all your vineyard and orchard requirements by offering a variety of ideas for consideration.

The company's research and development team has been working diligently on its new flat roof systems, D.O.V. systems, shade structures, and insect-screen structures while continuing to update its open-gable system, V.S.P. system, Open Lyre, Modified Lincoln, and Inverted Tattura systems in order to obtain the greatest yield from your crop.

CAL-PAC
Specializing in Trellis and Shade Structures

CAL-PAC's Pro-Net Bird Netting continues to assist customers in limiting the loss of crop to birds with exceptional results. Pro-Net Bird Netting can be installed and removed with ease.

Please visit the CAL-PAC website at www.cal-pac.com or call an experienced sales representative with your requirements.

For more information, contact:
CAL-PAC
PO Box 25848, Fresno, CA 93729
tel: 559/435-5893; fax: 559/435-3253
e-mail: info@cal-pac.com
website: www.cal-pac.com

Galo MacLean Nursery

Galo MacLean Nursery offers more than 26 years of nursery experience and provides technical advice on rootstock selection based on site. The nursery specializes in first quality, certified, dormant rootings of rootstocks and dormant benchgrafts.

Rootstock varieties include: 110R, 1103P, Teleki 5C, Kober 5BB, 101-4MG, 3309C, S04, and 140R.

Benchgrafts are made under contract to customer specifications.

Galo MacLean offers crucial expertise, based on backgrounds including degrees in enology, viticulture, agrichemistry, and soil microbiology.

For more information, contact:
Galo MacLean Nursery, Inc.
2160 Cuttings Wharf Rd., Napa, CA 94559
tel: 707/255-8874; fax: 707/255-4579

PLEASE SEE GALO MACLEAN'S AD, PAGE 38.

Biologically Integrated Organics®, Inc.

Biologically Integrated Organics®, Inc. (**bio**) is a leader in providing natural biological solutions for agriculture. **bio** personnel understand the importance of healthy soil and believe that there is no chemical replacement for what a diverse population of microorganisms and their complex, biological processes impart to the soil.

Plant and microbial communities share a symbiotic relationship, exchanging the benefits of proteins, nitrogen, and oxygen. The majority of microbes in the soil are beneficial to plant health, and maintaining a proper balance in microbial diversity and numbers can promote aerobic activity in the soil. This both aids in the assimilation of nutrients and drives the development of a vigorous root system.

bio
Biologically Integrated Organics® Inc.

Two **bio** products, CERES® and LiquiComp®, work together through biological processes to augment and stimulate the soil's microbial community. Each is loaded with microbes selected to create diverse, stable microbial populations.

In winegrape trials, applications of CERES and LiquiComp showed increased pruning and cluster weights against the control block and helped vines recover from harvest stress. Together, these products offer microbial diversity and strength. Ultimately, they lead to healthier, more productive vines.

For more information, contact:
Biologically Integrated Organics, Inc.
1720 Moon Mountain Dr.,
Sonoma, CA 95476
tel: 707/939-8090; fax: 707/939-8092
e-mail: sales@bio-inc.com
website: www.bio-inc.com

PMS Instrument Company

Regulated deficit irrigation (RDI) has been receiving increased attention from premium winegrape growers — and with good reason. RDI can increase fruit quality and control canopy vigor. The purpose of RDI is to withhold irrigation water to create a water deficit and thus build water stress in the vine. This stress can be measured with the Pressure Bomb, otherwise known as a Pressure Chamber.

The Pressure Bomb takes a water-stress reading directly from a vine leaf. At mid-day, the instrument is carried into the vineyard for readings. A plastic sandwich bag is placed around a fully-expanded leaf exposed to the sun. Next, the leaf is cut from the vine and immediately sealed into the chamber with the stem protruding through the lid.

The chamber is then pressurized until plant water is pushed to the exposed surface of the stem. The pressure required to do this is called "Plant Moisture Stress." Irrigation is then scheduled based on this measurement.

The Pressure Bomb (see photo) is the Model 610, which is one of PMS Instrument Company's most popular instruments for winegrape growers. Additional models with different features are available.

For more information, contact:
PMS Instrument Company
480 SW Airport Ave., Corvallis, OR 97333
tel: 541/752-7926; fax: 541/752-7929
e-mail: info@pmsinstrument.com
website: www.pmsinstrument.com
PLEASE SEE PMS INSTRUMENT'S AD, PAGE 53.

California Grapevine Nursery, Inc.

California Grapevine Nursery, Inc., is a grapevine nursery certified by the California Department of Food & Agriculture, providing growers with the highest quality planting materials. Available products include dormant rootstock and dormant grafted vines at very competitive prices.

Choose from 21 varieties of certified rootstock including the French-developed Gravesac variety. A large selection of scion varieties and clones including ENTAV-INRA® clones to customize your grafted vine order is also available. California Grapevine Nursery is a licensed agent of ENTAV-INRA® material in the U.S. with authentic clones from France.

Using state-of-the-art nursery practices, California Grapevine Nursery is not only dedicated to providing customers with the highest quality plants available, but also with excellent, efficient customer service.

For more information, contact:
California Grapevine Nursery, Inc.
1085 Galleron Rd., St. Helena, CA 94574
tel: 800/344-5688; fax: 707/963-1840
e-mail: sales@californiagrapevine.com
website: www.californiagrapevine.com
PLEASE SEE CALIFORNIA GRAPEVINE NURSERY'S AD, PAGE 24.

GK Machine, Inc.

The GK TR4 Vineyard Tracker is a self-propelled, hydrostatically-driven, multi-purpose, over-the-row, and rubber-tracked crawler with on-the-go track width adjustment from 96 to 136 inches. It also features height adjustment from 77 to 97 inches and automatic or manual self-leveling for stability and control in the vineyard.

Powered by a 200-HP diesel engine, the GK TR4 carries 400 gallons of spray material and can be equipped with a variety of spray systems, either electrostatic or air blast.

A front-mounted Cat II implement hitch and a 65-HP hydraulic power take-off with load sensing allows the GK TR4 to operate a variety of vineyard attachments (such as hedgers, pruners, and mowers) on multiple rows simultaneously.

For more information, contact:
GK Machine, Inc.
Roger Theberge
10590 Donald Rd., Donald, OR 97020
tel: 503/678-5525; fax: 503/678-5693
e-mail: gksales@gkmachine.com
website: www.gkmachine.com

Cellupore® Filter Sheets
Cellu-Stack® Cartridges

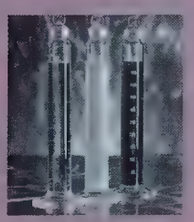
Millipore Filter
Cartridges

Chr. Hansen
Malolactic Bacteria

Novozymes®
Enzymes

Cellu-Flo® Filter Fibers

Oak-Mor®
Granular Oak



Fining Agents

Without Us, It's All Just Grape Juice

Basically, all wine starts off as grape juice. It's what you do to it throughout the winemaking process that determines what it will become. A delicate Chardonnay, a lush Cabernet Sauvignon, or maybe a refreshing Sauvignon Blanc.

And that's why winemakers worldwide rely on Gusmer***Cellulo*** for all of their wine processing needs. From Filter Media and Filter Housings to Fining Agents, Enzymes, ML Bacteria, Yeast, and much more. They rely on us for on-time delivery, our enviable reputation for customer service and our technical expertise which creates our unique "Service with Knowledge.™" You can buy equipment and supplies from other sources, but they won't have the "Service with Knowledge™" commitment that comes standard with all of our products. Rely on Gusmer***Cellulo*** and our products, because wine made without them is all pretty much just grape juice.

GUSMER*CELLULO*
GUSMER ENTERPRISES, INC.
Service with Knowledge™

East Coast:
1165 Globe Avenue
Mountainside, NJ 07092-0129
(908) 301-1811
Fax: (908) 301-1812

E-mail: sales@gusmercellulo.com

West Coast:
81 M Street
Fresno, CA 93721
(559) 485-2692
Fax: (559)-485-4254

Caldwell Nursery, Inc.

Caldwell Nursery, Inc., located in Napa Valley, has become known for its expertise in French clones. The nursery focuses on French ENTAV-INRA® clones and rootstocks, green-growing and dormant rootstocks, and grafted vines. There will be new clones of Cabernet Sauvignon, Merlot, Syrah, and Cabernet Franc available in 2002. Caldwell Nursery offers dormant spring budwood and fall fresh budwood for field budding.

John Caldwell has released a second edition of the *Concise Guide to Wine Grape Clones for Professionals*, providing information on wine trials with respect to soil, climate, and rootstock choices on French, Italian, and American clones.

The book is based on 15 years of research, beginning with Caldwell's first trip to Bordeaux, where he was introduced to a clonal program. The book came about because Caldwell wanted to provide an intellectual base for making clonal decisions. "We need to know why we use clones," says Caldwell.

Caldwell also provides consulting on vineyard planning and clonal decisions.

For more information, contact:
Caldwell Nursery, Inc.
169 Kreuzer Ln., Napa, CA 94559
tel: 707/255-1294; fax: 707/255-5162

PLEASE SEE CALDWELL NURSERY'S AD, PAGE 49.

California Seed & Plant Laboratory, Inc.

California Seed & Plant Laboratory, Inc. (Cal SPL), located near Sacramento, offers several laboratory tests for grapevines.

The firm was established in 1995 and employs a highly qualified technical staff (three Ph.D. scientists).

The laboratory offers PCR tests for viruses that are important to California viticulture, such as Pierce's disease, Eutypa, and crown gall, and offers culture tests for *Phaeoacremonium* and *Cylindrocarpon.*

Cal SPL is the only laboratory that offers real-time PCR (Smart Cycler) for detection of Pierce's disease on a year-round basis. The test was developed in cooperation with the USDA to detect Xylella in grapes and other host plants. The test is completed in 30 minutes and provides quantitative results.

The laboratory also provides disease elimination from grapevine varieties infected with viruses. Meristems are carefully removed and cultured on tissue-culture media. The resulting plants are tested for viruses and returned to the customer for propagation.

Variety and rootstock fingerprinting is done with internationally recognized SSR markers. Electronic images of the fingerprints are supplied for patent filing and other purposes.

For more information, contact:
California Plant & Seed Laboratory, Inc.
Parm Randhawa, Ph.D.
7877 Pleasant Grove Rd., Elverta CA 95626
tel: 916/655-1581; fax: 916/655-1582
e-mail: randhawa@calspl.com
website: www.calspl.com

UPCOMING SUPPLIER SHOWCASE: WINERY EQUIPMENT & COOPERAGE
January/February 2002
Call PWV to participate
415/479-5819

Terra Spāse, Inc.

Terra Spāse, Inc., a leading provider of information and technology to the winegrape industry, offers weather and disease risk maps, individual weather station data, and weather and disease forecasts for Napa and Sonoma counties online at www.Terraspase.com. USDA soil and USGS elevation data are also currently available for Napa County online.

Terra Spāse is the exclusive online provider of Fox Weather, LLC, weather products for the North Coast including: Satellite Rain Analysis, 10-day agricultural forecasts, a 30-day weather outlook, disease weather forecasts for botrytis and powdery mildew, and detailed, quantitative, satellite precipitation forecasts.

Terra Spāse also offers the latest technologies for the study of vineyard soils, weather, vine growth, and fruit production.

In 1999, Terra Spāse introduced Harvester Forecaster™, the first service for forecasting harvest dates and yields in specific vineyards. The program has been successful in forecasting October harvest dates for Cabernet Sauvignon vineyards as early as July 1.

The Terra Spāse Terroir Analysis program utilizes GIS and GPS for mapping soils, analyzing soil vigor potential, and recommending scion and rootstock combinations for vineyards in the North, Central, and South coasts.

Terra Spāse VINimage™ imagery is based on acrial multispectral data obtained with the ADAR 5500 platform. Terra Spāse has imagery for Napa, Sonoma, and parts of Lake counties from 1995 through 2001. Terra Spāse's aerial imagery has been used in projects to map vine canopy densities for improving harvest sampling, vine canopy management, pruning decisions, nutrition and irrigation management, and general vineyard assessments.

For more information, contact:
Terra Spāse, Inc.
345 La Fata St., Ste. D, St. Helena, CA 94574
tel: 707/967-8325; fax: 707/967-8596
e-mail: terraspase@earthlink.net
website: www.terraspase.com

Western Square Industries

Western Square is a major supplier of narrow-row trailers, and the only manufacturer of narrow-row trailers that can take four-foot-wide bins down a six-foot wide tractor row.

These models are the blue trailer, holding either one valley bin or two four-foot by four-foot (4 x 4) plastic bins, and a gray trailer, holding three 4 x 4 plastic bins. Both models feature plastic slides and ramps allowing bins to slide smoothly off the rear of the trailer.

Western Square also makes a green trailer for use in conventional tractor rows (over eight-feet wide) holding either one valley bin or two 4 x 4 plastic bins. This trailer also has plastic slides and ramps and does not need a forklift until it is loaded on a flatbed truck.

Western Square makes other trailers in a variety of configurations and two-ton harvest bins for the "valley system."

In addition to the trailers and harvest bins, Western Square is also the largest manufacturer of wine-barrel racks and barrel-rack systems.

For more information, contact:
Western Square Industries
1621 N. Broadway, Stockton, CA 95205
tel: 209/944-0921 or
inside CA: 800/367-8383
outside CA: 800/367-7810
fax: 209/944-0934
website: www.westernsquare.com
PLEASE SEE WESTERN SQUARE'S AD, PAGE 8.

Vintage Nurseries

Vintage Nurseries is a California-certified nursery that produces grapevines for the wine, table, and raisin industries. Established in 1989 by brothers Jeff and Greg Sanders, Vintage Nurseries has become the largest producer of dormant field-grown, bench-graft grapevines in North America.

Vintage Nurseries specializes in production of certified dormant benchgrafts, greenhouse-grown potted benchgrafts, dormant rootstock rootings, and other related products. Vintage Nurseries is currently shipping to grapegrowers worldwide.

Vintage Nurseries is committed to providing customers with the best quality grapevines and customer service the industry has to offer, along with the industry's most competitive pricing. Please feel free to request a list of satisfied customers who will confirm that Vintage Nurseries is..."*a cut above.*"

For more information, contact:
Vintage Nurseries
Steve Huffman, International Sales Manager
PO Box 279, 27920 McCombs Ave.
Wasco, CA 93280
tel: 209/523-8036; fax: 209/523-8036
e-mail: steve@vintagenurseries.com
website: www.vintagenurseries.com
PLEASE SEE VINTAGE NURSERIES' AD, PAGE 60.

Agri-Analysis Associates

Agri-Analysis Associates provides a comprehensive panel of diagnostic tests to detect viral, bacterial, and fungal pathogens in grapevines. Sensitive and specific assays are available to detect grapevine leafroll-associated virus types, grapevine fanleaf virus, corky bark-associated virus, as well as Pierce's disease and *Phytophthora* spp.

Information provided by the assays helps nurseries and growers select the best material suitable for propagation. Laboratory confirmation of field diagnosis of diseases provides assurance that the problem is not related to nutrient deficiencies.

Diagnosis and documentation of suspected fungal diseases, such as oak root fungus, *Eutypa, Cylindrocarpon,* as well as *Phaeoacremonium,* can also be performed in the Agri-Analysis lab using traditional isolation and identification procedures by qualified and experienced personnel.

Isozyme profile analysis on rootstocks using isoelectric focusing that can aid in the diagnosis of production problems in replanted vineyards, often related to the inadvertent use of non-phylloxera-resistant varieties in infested soils is provided by Agri-Analysis Associates. Isozyme profile analysis can definitively compare unknown or questionable rootstock samples to known standard varieties to assure "trueness-to-type" in material to be propagated as well as planted grapevines.

Agri-Analysis Associates can also provide assistance in the design, lay-out, and analysis of data from field trials. Contract research projects in tissue culture and fungal inoculum production can also be performed in the company's plant pathology laboratory equipped with full-size autoclave and laminar air flow hood for sterile culture handling.

For more information, contact:
Agri-Analysis Associates
Glenn Friebertshauser
45133 County Rd. 32 B, Davis, CA 95616
tel: 530/757-4656; fax: 530/757-4655
e-mail: agrialys@yvm.net
PLEASE SEE AGRI-ANALYSIS' AD, PAGE 12.

Toyota Material Handling

Toyota Material Handling (TMH) is introducing a new line of electric lift trucks to its 7-Series line-up. These trucks provide exceptional power, performance, safety features, design, and serviceability.

The new four-wheel electric lift trucks feature an AC-drive system, TMH's System of Active Stability™ (SAS), and are offered in a broad range of capacities to suit almost every industry and application. The four-wheel electric lift trucks also feature an easy-to-read multifunction LCD that allows operators and other personnel to monitor battery charge levels, program performance parameters, and access self-diagnostic codes for quick serviceability.

The AC-drive system is engineered to enhance performance, productivity, and durability like no other lift truck can offer. It allows for quick acceleration, high speeds, long-lasting power, and minimal operating costs.

The AC-drive system features advanced power regeneration technology. This helps the forklift recover energy from its own momentum and direct it back to the battery resulting in a highly efficient, more productive forklift with a battery that runs longer and requires less charge time and electricity.

For more information on the full line of dependable products and services from TMH, please call 800/527-3746 or visit its website at www.tmhnc.com

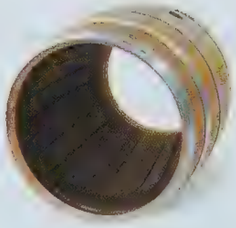
Toyota Material Handling..."Not Just Another Forklift Dealer."

For more information, contact:
Toyota Material Handling
31010 San Antonio St., Hayward, CA 94554
tel: 866/TMH-LIFT; fax: 510/675-0400
e-mail: info@tmhnc.com
website: www.tmhnc.com

PLEASE SEE THE TOYOTA MATERIAL HANDLING AD, PAGE 44.

Mendocino Cooperage
FULL OF CHARACTER

at Mendocino Cooperage we keep our experts on their toes!



CALL TODAY TOLL-FREE 888-340-2244

Dow AgroSciences LLC

If you want to avoid the "replant problem" — where grapevines are planted into soils plagued with nematodes and soil-borne diseases — then soil fumigation may be the solution.

Telone soil fumigant helps protect roots when protection is needed most — in the first few years when root systems become established. Fumigation with Telone creates a zone of protection around roots, allowing them to develop in an environment where nematodes are controlled and soil-borne diseases are managed. The result: extensive, healthy root systems capable of producing decades of high-quality, high-yielding crops.

Telone®

Everything grows better.™

Starting vines with a healthy, strong root system leads to many other benefits such as generating early growth response, promoting plant longevity and productivity, creating more efficient use of water and fertilizer, and allowing for more rootstock choices.

To order the FREE guide, *Managing Nematodes and "Replant Disease" with Soil Fumigation*, call 888-395-PEST. Visit www.dowagro.com for a listing of Telone sales specialists in your area.

For more information, contact:
Dow AgroSciences LLC
9330 Zionsville Rd.
Indianapolis, IN 46268-1054
tel: 800/258-3033
website: www.dowagro.com

Duarte Nursery, Inc.

Choose Duarte Nursery Big Pot Benchgrafts for your vineyard; measure the quality by their performance. Duarte backs your Big Pot Benchgraft with a guaranteed stand and offers free delivery in most of California and Oregon.

Duarte offers one of California's best vineyard service teams. A Duarte viticultural consultant is available to provide sales and service throughout California and Oregon's grapegrowing regions.

DUARTE NURSERY INC.

With the use of Big Pot Benchgrafts backed by consultation from Duarte's vineyard service team, you're guaranteed a successful planting.

Duarte defines quality as your complete satisfaction. Please call today.

For more information, contact:
Duarte Nursery, Inc.
1555 Baldwin Rd., Hughson, CA 95326
tel: 209/531-0351 or 800/GRAFTED
fax: 209/531-0352
e-mail: sales@duartenursery.com
website: www.duartenursery.com
PLEASE SEE DUARTE NURSERY'S AD, PAGE 88.

BirdDeter USA LLC

Understanding bird behavior is essential when planning a course of action to protect your grapes. Once scout birds have found the grapes and reported back to the main flock, it is difficult to break birds from the habit of feeding in a particular area once they are established. Birds acclimate quickly to repetitious or static deterrents (habituation) and will attract other birds while feeding on your crop, compounding the problem.

To protect your grapes, a deterrent is needed that will: be in place to divert the first scout birds, be responsive to bird incursion and deliver a different deterrence each activation to prevent habituation, be located and designed to divert birds to other feeding areas, be installed prior to grape ripening to avoid interference with management practices, be capable of operating a variety of deterrents simultaneously to maximize the effect; be robust, easy to use and maintain, and deliver benefits for a long time; be cost-effective with short payback (usually less than one season); be on duty from sunrise to sunset every day.

A deterrent that factors in bird behavior is a smart way save your grapes. BirdDeter USA LLC offers the BIRDDETER, the only bird deterrent that meets these criteria.

For more information, contact:
BirdDeter USA LLC
1585 Industrial Rd., San Carlos, CA 94070
U.S.: tel: 650/610-7905
Australia: tel: +61-7-4667-0491
fax: +61-7-4667-0493
e-mail: info@birddeter.com.au
website: www.birddeter.com.au
PLEASE SEE BIRDDETER'S AD, PAGE 45.

Equipment That Works!

The Vineyard Auger is designed to mount on the side of your tractor and be operated from the tractor seat. It operates on eight gallons of hydraulic fluid per minute yielding 350 lb/ft of torque at 2,000 psi and drills a nine-inch diameter hole 12 inches deep.

The unit is available in two boom lengths. The short boom is 32 inches long with an extension of 12 inches and a total reach of 44 inches. The longer boom has a 40-inch stowed length with an extension of 18 inches for a total reach of 58 inches. Choose the length that matches your vine row and tractor width.

Vineyard Augers are in use from Oregon to Georgia, California to New York. They can be operated from almost any tractor with adequate hydraulic flow. One user has it mounted on a crawler tractor in the center of the blade mount on a pivot so that the unit can work on either side of the tractor.

The standard package includes a nine-inch diameter, 12-inch long auger mounted on a boom that will stow within the track of the tractor. The package also includes a three-section control valve that mounts on the floorboards of your tractor or on a platform extension if the tractor is too narrow for both operator and valve control. Up to 250 holes per hour have been reported. Literature is available upon request.

For more information, contact:
Equipment That Works!
tel: 800/242-4479; fax: 913/677-4614
PLEASE SEE EQUIPMENT THAT WORKS' AD, PAGE 83.

Helena Chemical Company

Helena Chemical Company is a national distributor of crop production inputs with a major presence in grape growing regions across the U.S. This includes crop-protection chemicals, fertilizer, specialty fertilizers, micronutrients, adjuvants, seed treatments, bio-science products, value-added generic pesticides, and many other inputs. Helena has expertise in high-quality adjuvants, and is considered a leading company in developing and marketing new and unique adjuvant technology.

One of the company's newest bio-science products is ARMICARB® 100, a broad-spectrum, contact fungicide in an "environmentally sensible" formulation. ARMICARB 100 is highly effective against diseases such as powdery mildew. The active ingredient in ARMICARB 100 is potassium bicarbonate in combination with a unique blend of surfactants.

Other products used extensively by grape producers include CoRoN®, a foliar-applied controlled-release nitrogen that releases nutrients to the grapevines over a multi-week period. This reduces potential for leaf burn, as well as excessive run-off of nitrogen. Helena also offers Ele-Max® Precision Nutrition™ micronutrients. This line of products provides consistent, high-quality results for grape producers.

With headquarters in Collierville, TN, Helena has been in operation since 1957. Across the U.S., Helena has approximately 250 sales locations situated in productive agricultural regions. Its theme is People...Products...Knowledge™.

For more information, contact:
Helena Chemical Company
225 Schilling Blvd., Ste. 300
Memphis, TN 38017
tel: 901/761-0500; fax: 901/683-2960
website: www.helenachemical.com

PLEASE SEE HELENA CHEMICAL'S AD, PAGE 75.

Kimco Mfg. Inc.

Kimco, with the introduction of the new Model 2001 narrow-row tiller, is now able to bring all the advantages of the proven Model 9300 to the grower who has rows less than six feet wide. It is the first truly heavy-duty in-row tiller capable of working in rows as narrow as four feet. The Model 2001 can be mounted on the front of a small tractor or on an over-the-row tractor.

Both models of Kimco in-row tillers operate in virtually any terrain, from flat to hills. The Kimco gives the grower a great advantage of not having to catch weeds when they are small in order to remove them. Weeds from just-emerged to six feet high are easily removed in a single pass from soil that can be wet or dry, hard or soft, sandy or rocky.

The vineyard's irrigation system is of no concern (provided the drip irrigation line is suspended). The Kimco works well with all systems, whether with or without berms.

Both Kimco models are mounted ahead of the operator for better visibility. The Kimcos can be double-mounted (one on each side) to more than double productivity.

For more information, contact:
Kimco Mfg., Inc.
9200 W. Barstow Ave., Fresno, CA 93722
tel: 559/277-9300; fax: 559/277-9358
e-mail: kimcotill@attitude.com
website: www.kimcomfg.com

PLEASE SEE KIMCO'S AD, PAGE 47.

Pacific Western Container

A vine with early growth enhancement and protection provided by Vine Protectors will always be ahead of a vine of the same age that has none.

Giving young vines a strong start in the first growing season will enhance survival by protecting them from wind damage, animal destruction, and chemical sprays. In addition, Vine Protectors save water and labor costs. Less water is needed because moisture around the plant is retained. Plants can grow taller before tying is needed, reducing labor costs.

The difference between a Vine Protector and a grow tube is the material from which they are made. Vine Protectors are white milk carton-type material, poly-coated on two sides, that will last approximately 12 to 18 months depending on field and weather conditions.

Traditionally, milk cartons have been used with some success. While the idea is good, the size is not. Vine Protectors solve the problem. They are much taller, holes are provided for tying to cordon wire, and a flap and a slit allow attaching to a bamboo stake. Two styles are available: square in 20, 24, or 36-inch and a three-sided Tri-tube in 20 or 24-inch height.

Field tested for five years, Vine Protectors typically outperform traditional milk cartons in many ways.

Pacific Western Container manufactures specialty agricultural products such as Vine Protectors, Tree Protectors, Plant Bands, and a wide variety of corrugated containers for shipping, display, and point-of-purchase. Since 1973, it has produced high quality products and offered exceptional service to customers.

For more information, contact:
Pacific Western Container
tel: 800/241-3513 or 714/547-9266
fax: 714/953-9270
website: www.pacificwestern.com

PATCHEN, INC.

Saving money on chemicals and labor are the main reasons why leading growers use the WeedSeeker® Selective Spray System to control weeds in their vineyards. It sprays only weeds, not bare ground or dirt, reducing chemical use up to 80%.

While most vineyard sprayers operate at five to six miles per hour, the WeedSeeker® sensors are designed to spray at speeds up to 10 mph. One operator with a WeedSeeker® Vineyard System moving twice as fast down the tractor row as a conventional two-man crew spot-spraying is incredibly more cost-effective and efficient.

The WeedSeeker® Vineyard system is easy to use and can be mounted on ATVs, tractors, and a variety of utility vehicles. The sensors are mounted under hoods on a spray boom to protect the vines from drift and can be used to spray berms and middles.

Patchen, Inc. is an agricultural technology leader offering growers worldwide one of the most exciting solutions available to the age-old problem of weed control.

For more information, contact:
Patchen, Inc.
740 S. State St., Ukiah, CA 95482
tel: 888/728-2436
fax: 707/467-3750
e-mail: www.info@weedseeker.com
website: http://www.weekseeker.com

PLEASE SEE PATCHEN'S AD, PAGE 34.

STIHL, INC.

STIHL is a world leader in portable outdoor power equipment. Since 1926, STIHL has specialized in development and manufacturing of a wide range of portable outdoor power tools. The company has established a dedication to quality that has made STIHL one of the most dependable brand names on the market for over 75 years.

STIHL offers a variety of tools that make easy work out of arduous vineyard tasks. For professionals working in restricted-emissions areas, STIHL offers the FS 83R grass trimmer and HL 73 hedge trimmer. Both products are specially designed to meet CARB II emissions regulations, yet also include valuable features such as the EASY-START® system and "lifetime" drive shaft, ignition and clutch warranties.

STIHL®

The HS 80 is a versatile, double-sided hedge trimmer designed for professional cutters. Its 180º swivel rear handle makes vertical trimming easier.

Last but not least, STIHL Precision Series™ hand tools can help make quick work of virtually any small pruning task.

Please visit STIHL's website at www.stihlusa.com, or call 800/GO STIHL (800/467-8445).

For more information, contact:
STIHL, Inc.
tel: 800/GO-STIHL (800/467-8445)
website: www.stihlusa.com

RWF INDUSTRIES

The BRON 150V is a specialized, self-propelled drainage plow with a narrow gauge 72-inch outside track width. The plow is ideal for new drainage or sub-soiling in vineyards or areas where access is severely restricted by crop row width or right of way.

The 150V features a BRON 400 drainage plow that maintains grade accuracy to a maximum 60-inch plowing depth and chute sizes to suit most applications.

The tractor features a CAT or Cummins 200 horsepower power plant, variable two-speed hydrostatic track drive with independent drive pumps and an auxilliary pump for the plow and back-up attachments. The 150V comes with CAT D4 chains, sprockets, and rollers with a track length of 112-inch and 17-inch pads.

RWF Bron is an industry leader in the design and manufacture of drainage products for the agricultural industry. RWF Bron products are sold and serviced throughout the world.

For more information, contact:
RWF Industries
tel: 800/263-1060 or 519/421-0036
website: www.bronrwf.com
email: rwf@wwdc.com

SPEC TRELLISING

Spec Trellising is all about quality. For critical applications such as grapevine trellising, Spec believes that only high-quality, long-lasting materials should be used. The company's goal is to develop long-term relationships with all of its clientele, and it works hard at reaching this goal. Affordably priced, high-quality products combined with unbeatable service serve as Spec's recipe for success.

To help achieve its goal, Spec has added some new, innovative products to its grape trellis product line. In addition to the existing product line, including metal and wood posts, Zalcote vineyard wire, the Wirelock Wire Joiner, and the Wirelock Trellis Anchor, Spec has added the SnapMax™ Vine Shelter, the Bahco™ pruners, snips and loppers, and the Prothec System™ for vine tying.

Perhaps the most exciting new Spec product offering is actually not a grape trellis product, but a winemaking product, and is perhaps the most exciting new product to hit the winemaking market in years — the revolutionary Fermentabag™. A flexible fermentation cell, the Fermentabag™ (250-gallon capacity) is a disposable fermentation product, which eliminates punch down and pump-over that is normally required for red wine fermentation. Improved color extraction and enhanced flavor are obtained through the Fermentabag™ process, at a fraction of the cost of stainless steel.

For high-quality, affordably priced grape trellis materials and the Fermentabag™, give Spec a call today.

For more information, contact:
SPEC Trellising
39 Indian Dr., Ivyland, PA 18974
tel: 800/237-4594 or 215/322-5588
fax: 215/357-3122
e-mail: info@spectrellising.com
website: www.spectrellising.com

PLEASE SEE SPEC TRELLISING'S AD, PAGE 51.

Jim's Supply Co., Inc.

From start to finish, Jim's Supply Co., Inc. can be your partner in the successful installation of your vineyard. Jim's Supply is a manufacturer of metal stakes, posts, crossarms, and braces, and carries wire, clips and ties, grow tubes, and wire tightening devices and tools — everything you'll need for your trellis system.

Customers may also choose from a variety of products for the vineyard such as: fasteners, u-bolts, netting and fencing for birds, animals, and erosion control, pruning tools, scales, and refractometers.

Call to discuss the trellis design for your growing area and grape variety.

Jim's Supply, in business since 1959, has a salesroom in Calistoga, CA, and a 10-acre sales facility in Bakersfield, CA, where you're sure to find what you need.

To find out how to optimize your canopy management and to order vineyard products call 800/423-8016 or call the Jim's Supply sales representative in your area.

For more information, contact:
Jim's Supply Co., Inc.
3530 Buck Owens Blvd., PO Box 668
Bakersfield, CA 93302
tel: 661/324-6514 or 800/423-8016
fax: 661/324-6566
4102-A St. Helena Hwy.
Calistoga, CA 94515
tel: 707/942-JIMS (5467); fax: 707/942-9752
In Fresno, CA: tel: 559/930-6165
In Monterey, CA: tel: 831/674-1000
e-mail: jimssci@jimssupply.com
website: www.jimssupply.com

PLEASE SEE JIM'S SUPPLY CO.'S AD, PAGE 46.

Sunridge Nurseries

Sunridge Nurseries introduces a new plant protector that is an affordable way to protect young vines from herbicide sprays, small animal feeding, and wind damage.

When planting dormant vines, the top of the plant protector can be closed,

which simulates a humid greenhouse environment, enabling the vine to push buds without drying out.

Mounding is a good way to help keep the vine buds from desiccating while roots are taking hold, but is costly and not always effective. Sunridge Nurseries' plant protectors can take the place of expensive mounding. This new method of sealing the top of Sunridge's plant protector mimics mounding and lowers labor costs. Once the root takes hold and the vine buds push, the plant protector can be opened or unsealed quickly, no shovel needed, and can simulate a common grow tube.

For more information, contact:
Sunridge Nurseries
441 Vineland Rd., Bakersfield, CA 93307
tel: 661/363-VINE (8463); fax: 661/366-4251

PLEASE SEE SUNRIDGE NURSERIES' AD, PAGE 31.

Bird Gard/JWB Marketing

Bird Gard/JWB Marketing sells the Bird Gard PRO series of digital, distress-call bird repellers. There's a model for three acres, one for up to six acres, and the MEGA PRO with a 200-watt amplifier and 20-speaker tower that covers up to 40 acres.

The Crop Gard PRO series uses harassment sounds for tough birds like linnets, mocking birds, and high-pressure from starlings and robins. Like the Bird Gard, there's a model for three acres, one for up to six acres, and the MEGA PRO with a 200-watt amplifier and 20-speaker tower that covers up to 40 acres. When combined, the two systems achieve results comparable to netting.

Bird Gard/JWB Marketing's exclusive visual scare product is the Scare Windmill. It uses a unique UV-light-reflecting paint on the blades to repel birds in a two-acre area. Recently, it was discovered that one-half of a bird's vision is within the UV-light range. The movement of the blades in the wind looks, to the birds, like the commotion of a flock of birds taking off in fright, which causes a chain reaction.

For more information, contact:
Bird Gard/JWB Marketing
101 Hurlbut St., Westwood, NJ 07673
tel: 800/555-9634; fax: 201/666-7581
e-mail: birdgard@ix.netcom.com
website: www.birddamage.com

Monterey Chemical Company

Kaligreen is an 82% soluble, powdered, potassium-bicarbonate formulation that is highly effective when used as a contact agent to knock out powdery mildew outbreaks and to help clean up established mildew. Kaligreen® (originally developed in Japan) is marketed in the U.S. by Nichimen America through the Monterey Chemical Company.

KALIGREEN®

Formulated to help target your disease control program, Kaligreen has been field-tested to be effective, environmentally-safe, and economical for contact control of powdery mildew when compared to other fungicides. Kaligreen has shown excellent results when used by itself, in tank-mix combinations with other powdery mildew fungicides, or in an alternating program.

Versatile and proven in a wide variety of crops, Kaligreen fungicide is registered for use on over 40 crops including grapes.

Kaligreen is approved by the Washington State Department of Agriculture Organic Food Program and is listed by the Organic Materials Review Institute for use in organic production — so your crop is assured of disease resistance and organic recognition.

For complete information on Kaligreen, contact:
Monterey Chemical Company
PO Box 35000, Fresno, CA 93745
tel: 559/499-2100; fax: 559/499-1015
e-mail: www.montereychemical.com

KLR Machines

KLR Machines now offers vineyard trailers manufactured by STHIK.

Located in the Cognac region of France for more than 20 years, STHIK has grown to become the largest manufacturer of lift trailers in France dedicated to grape harvesting. Recently, several U.S. wineries have shown an interest in the STHIK lift trailer.

Everything from engineering to the final precision weld is done by STHIK to construct efficient, well-designed trailers.

STHIK takes pride in the engineering of the combination of a patented hydraulic lifting frame and well-designed bin. The hydraulic lifting frame raises and lowers its load to the required height without compromising stability. In order to easily load the grapes, each model has been designed with the lowest clearance possible. STHIK trailers can hold from two to seven tons of grapes and are manufactured to match the needs of quality-focused vineyards.

The most popular trailer, the EVO (see photo), has a stainless steel bin combined with an oversized slow-rotating screw to reduce grape damage. This STHIK trailer delivers grapes to inspection tables, destemmers, or presses with heights up to 9.5 feet, due to its adjustable hydraulic frame.

For more information, contact:
KLR Machines
350 Morris St., Ste. E, Sebastopol, CA 95472
tel: 707/823-2883; fax: 707/823-6954
e-mail: klrmach@pacbell.net
website: www.sthik.com

PLEASE SEE KLR MACHINES' AD, PAGE 20.

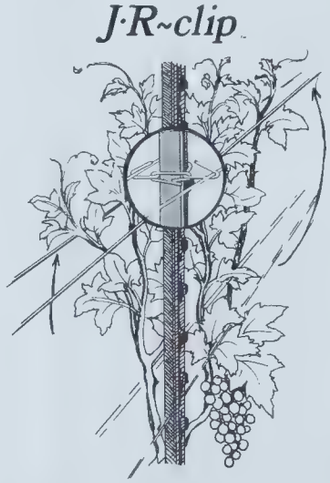
Vineyard Industry Products Co.

Vineyard Industry Products Company (VIP) has supplied trellis systems and supplies to California grapegrowers for two generations. VIP has a knowledgeable sales staff, and offers competitive prices and exceptional customer service.

VIP carries a large inventory in its Paso Robles (Central Coast) and Windsor (North Coast) locations.

Inventory consists of: domestic class-1 galvanized high-tensile wire, T-posts (both rail and billet), rolled-edge highway posts, crossarms, drill-stem pipe end-posts, pressure-treated lodgepoles, rebar and pencil rod training stakes, clips to fit all stakes, Gripple-brand wire connectors and tighteners, double-welded screw-in earth anchors, deer fencing, grow tubes, bird netting, and pruning and tying tools.

VIP offers the patented (Pat. #5501035 & #5916028) J~R Clip™. Designed to fit all sizes of T-posts for vertical trellis systems, this versatile clip is installed in seconds and withstands mechanical harvesting and pruning.



For more information, contact:
Vineyard Industry Products Company
John Downer or **Rey Sanchez**, Sales
North Coast
10603 Old Redwood Hwy.
Windsor, CA 95492
tel: 800/544-2210; fax: 707/431-0807
Central Coast
10-B Volpi Ysabel Rd.
Paso Robles, CA 93446
tel: 805/226-9960; fax: 805/226-9818
e-mail: info@vinbiz.com
website: www.vinbiz.com

Kinsey Agricultural Services, Inc.

Established in 1973, Kinsey Agricultural Services' (KAS) works with over 200 wineries and vineyards throughout the U.S. and as far away as Australia and South Africa. Whether on established vineyards, or new sites for wine grapes, the KAS consulting program uses proven scientific principles to build top-quality vineyard soils and wine grapes.

KAS specializes in solving soil problems and finding the resulting limitations placed on vines and grapes, including: hard, compacted areas, soils high in sodium, low in fertility, and lacking key nutrients, (including trace elements); soils that have received too much lime or compost; and soils or vines that have difficulty taking up adequate moisture. These are typical problems KAS has helped growers eliminate in the vineyard.

Vineyard fertility programs utilized by Kinsey clients range from 100% conventional to certified organic. In addition to soil tests, KAS accepts samples of composts or soil amendments intended for vineyard application. This includes helping those who use grape pomace to build the best useable compost. Each analysis is then evaluated to advise whether it would be appropriate for use, according to fertility of each sample.

When establishing new vineyards, the soil fertility program should ideally start three years before planting begins to assure optimum results. Samples of both topsoil and subsoil should be taken down to a soil depth which can be sufficiently worked to maximize fertilizer potential.

Training programs on soil quality and how to understand and utilize soil tests are also conducted as posted on www.kinseyag.com.

For more information, contact:
Kinsey's Agricultural Services
Neal W. Kinsey
297 County Highway 357
Charleston, MO 63834
tel: 573/683-3880; fax: 573/683-6227
website: www.kinseyag.com

Weed Badger Division

Since 1979, Weed Badger Division has manufactured a full line of rugged, commercial-duty, hydraulic-rotary vineyard tillers and mowers. More than 10 upgradeable Weed Badger models are cost-effective tool carriers for a variety of attachments including the Model 3875 Mower, Sweeper/Tiller, Badger Broom, Cyclone Spade, and many more.

Weed Badger's high-speed precision, in-row rotary tillage is an economical alternative to chemical weed control or hand labor. Weed Badger is the only tool of its type to kill big weeds while conditioning and aerating soil resulting in optimum water penetration. Weed Badger vineyard model machines hill-up and hill-down soil and incorporate soil amendments while controlling weeds.

The Weed Badger kills all weeds including Johnson and Bermuda grass and tough herbicide-resistant weeds. Weed Badger eliminates hassles, risks, and liability concerns for potential exposure involving workers, area residents, and nearby growers. Eliminate trash habitat under the canopy where disease-carrying insects and rodents reside over winter. Weed Badger is a top choice for conventional grapegrowers, IPM programs, organic growers, and research centers.

Take advantage of Weed Badger Division's excellent factory-direct service and discounted prices. Call 800/437-3392 or email to weedbadg@drtel.net today and ask for a free video or visit the website at www.weedbadger.com.

For more information, contact:
Weed Badger Division
Town & Country Research & Development, Inc.
5673 SE 95 Ave., Marion, ND 58466
tel: 800/437-3392 or 701/778-7511
fax: 701/778-7501

PLEASE SEE WEED BADGER'S AD, PAGE 35.

IF IT'S
WINE BOTTLES...
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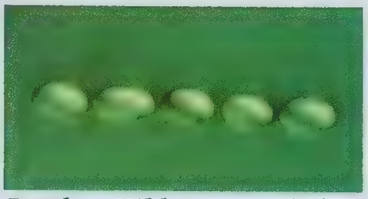
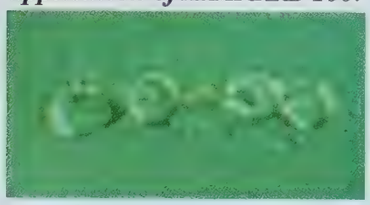
ARMICARB® 100

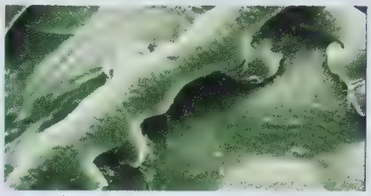
Simple and Effective Foliar Disease Control.



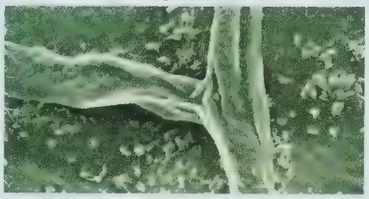
Powdery Mildew spores before application of ARMICARB 100.



Powdery Mildew spores after application of ARMICARB 100.



Powdery Mildew mycelium before application of ARMICARB 100.



Powdery Mildew mycelium after application of ARMICARB 100.

"Environmentally Sensible"

New ARMICARB 100 from Helena controls a wide range of foliar diseases on many food crops and plants with its "environmentally sensible" formulation. The unique and effective product poses no significant risks to human health or the environment.

ARMICARB 100 is an advanced formulation of potassium bicarbonate. This broad-spectrum foliar fungicide achieves effective disease control with unique, multi-site contact activity. When in direct contact with fungi, ARMICARB 100 works rapidly through a combination of osmotic pressure, pH and the effects of specific bicarbonate ions.

The beauty of ARMICARB 100 is its simple effectiveness and "environmentally sensible" formulation. Since potassium bicarbonate is a simple compound found in nature, using it as an effective fungicide is not considered disruptive to human health or the environment.

Currently, ARMICARB 100 is registered for use on many agricultural and ornamental crops, with registration pending on many other crops and plants.

ARMICARB 100 offers many advantages:

- **Effective, Broad-Spectrum Foliar Disease Control**
- **No Significant Impact on Human Health or the Environment**
- **No Pre-Harvest Interval (PHI), Four Hour REI (Re-Entry Interval) Following Application**
- **Multi-Site Contact Activity**
- **Low Probability of Resistance Development**
- **Effective and Viable Resistance Management Tool**
- **Advanced Bicarbonate Technology**

For details on how ARMICARB 100 can give you effective, "environmentally sensible" foliar disease control, talk to your local dealer or Helena representative.

HELENA *People...Products...Knowledge...*

Helena Chemical Company • 7576 N. Ingram • Suite 101 • Fresno CA 93711 • 559-261-9030 • www.helenachemical-ca.com

ARMICARB is a registered trademark of Church & Dwight Co., Inc. Always read and follow label directions. ©2001 Helena Chemical Company.

Orchard Valley Supply

Orchard Valley Supply is a family-operated company, established in Fawn Grove, PA, in 1986 and currently operating in Quakertown, PA, between Allentown and Philadelphia.

Orchard Valley Supply is dedicated to providing high-quality products and services for the vineyard industry and provides everything between the vine and the wine. This includes trellis, training, pruning, irrigation and harvesting supplies, as well as safety clothing and equipment, sprayers, wildlife control, books, and winemaking supplies.

Orchard Valley Supply is in business to provide first class products and services and cater to the specifications of each individual customer at a competitive price.

To handle all your vineyard needs visit www.orchardvalleysupply.com or call toll free at 888/755-0098. If you need an item that you cannot find in the Orchard Valley Supply catalog or on the website, please call or send an email and the company will find it for you and add it to its product line.

Orchard Valley Supply provides discounts for first-time customers and a rebate program for repeat customers. Make sure you ask for details when you call!

For more information, contact:
Orchard Valley Supply
624 Campus Dr., Perkasie, PA 18944
tel: 888/755-0098
website: www.orchardvalleysupply.com

PLEASE SEE ORCHARD VALLEY SUPPLY'S AD, PAGE 40.

VESTRA Resources, Inc.

Maps and digital information provided by VESTRA Resources, Inc., are suitable for a GIS (Geographic Information System) or as GIS analysis. VESTRA maps vineyards as digital information and aids growers and wineries in mining the data for information. VESTRA delivers services, software, training, and imagery centered on the geography of the vineyard.

VESTRA's information products are used in a myriad of ways: to aid vineyard management (especially in increasingly complex rootstock and microclimate sites), planning harvest for top-quality, marketing premium wine grapes, delineating problem areas in vineyards, and as site analysis for property acquisition and development plans.

On the winery or management side, uses of VESTRA products include: development of proposed American Viticultural Area, wine education and marketing, and joining winemaking information with vineyard information. AVA maps can be customized to show vineyard and winery locations.

VESTRA offers multispectral or black and white imagery, featuring the latest offerings acquired by airplane or satellite. Digital multispectral image analyses for vigor/stress and aerial photography with contours are products that add value to its projects.

VESTRA is an authorized reseller and training site for ESRI (Environmental Systems Research Institute, Redlands, CA) GIS software products and supports its clients with on-site visits, delivering project-specific training and consultation.

Committed to providing quality, VESTRA uses innovative products and integrates these products to make the most of your information resources.

For more information, contact:
VESTRA Resources, Inc.
962 Maragua St., Redding, CA 96002
tel: 530/223-2585; fax: 530/223-1145
e-mail: jamie@vestra.com
website: www.vestra.com

PLEASE SEE VESTRA RESOURCES' AD, PAGE 84.

Vineyard Water Systems

Vineyard Water Systems specializes in providing grapegrowers with practical solutions to drip and micro-irrigation challenges. Staff members' experience in the winegrape industry as licensed pest control advisors, certified crop advisors, and certified irrigation designers allows them a unique perspective in irrigated vineyard management.

In addition to helping growers create new projects by providing irrigation designs and bid reviews, they are also able to apply their experience to management of existing systems.

The issues of filter maintenance, fertigation and chemigation, water chemistry, emitter plugging challenges, and system automation are all within the realm of their experience. Both partners of Vineyard Water Systems, Lizanne Wheeler and Patrick Brown, are skilled as bilingual trainers and can provide customized training to vineyard irrigation management teams.

When it comes to addressing the challenges of applying the appropriate amounts of water and nutrients to your vines in a safe and economical manner, you can make your management team the most efficient possible by calling Vineyard Water Systems, the vineyard irrigation specialists.

For more information, contact:
Vineyard Water Systems
521 Lucerne Rd., Cayucos, CA 93430
tel: 805/995-0587; fax: 805/995-0205
website: www.vineyardwater.com

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- ☐ Airmail delivery outside U.S.A. $20

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TOTAL	

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PWV BOOKSHELF

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Geoffrey Schahinger, Bryce Rankine
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Handbook of Enology, Vol I
The Microbiology of Wine / Vinifications
P. Ribéreau-Gayon, D. Dubourdieu, B. Donèche, A. Lonvaud
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Handbook of Enology, Vol II
The Chemistry of Wine Stabilization and Treatments
P. Ribéreau-Gayon, Y. Glories and D. Dubourdieu, A. Maujfan
Basic chemistry of wine formation and wine composition. Combines chemical theory with description of day-to-day work in latter stages of winemaking from clarification and stabilization to ageing processes in tanks and barrels. **410pp—$144.00**

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Lexiwine
Paul Cadiau
English/French wine dictionary contains over 3,500 words and phrases on grapegrowing and winemaking **$19.95**

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D.P. Pongracz
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The Taste of Wine
Emile Peynaud
A masterclass on the science, procedures, and vocabulary of the trade for the professional. An essential work of reference for the amateur. **258pp—$39.95**

Remember - Books from the PWV BOOKSHELF make great Christmas gifts

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For more information, contact:
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PLEASE SEE GLOBAL GREEN'S AD, PAGE 46.

LETTERS

Editor:

Dr. Richard Smart's insight and candor presented in his *PWV* column is of great value to the California wine industry. His latest column on fruit exposure to sunlight is no exception ["Fruit exposure — Desirable in hot climates?" September/October 2001].

I suspect the reason his experiences with fruit exposure in Australia did not transfer to California is because California differs from Australia or most other warm winegrape-growing areas in that it [California] has more hours of sunlight.

This difference is very evident in Figure 2 of John Gladstones' *Viticulture and Environment* (Winetitles, 1992) ["Total Sunshine Hours Versus Summation of Biologically Effective Day Degrees C for October–April (S. Hemisphere) or April–October (N. Hemisphere)," page 24].

For example, Fresno, Lisbon, and Adelaide have similar seasonal accumulated degree days, but Fresno receives 400 more sunlight hours than Lisbon and 800 more than Adelaide. And Napa receives 300 more hours of sunlight than Glenn Innes, New South Wales, and 650 more hours than Bordeaux, while all have similar degree days.

In fact, among the locations presented in Gladstones' figure, only Walla Walla and Prosser in Washington state have combinations of heat units and sunlight hours similar to locations in California [Napa Valley and Santa Clara County].

Stan Grant
Vineyard Consultant
Progressive Viticulture
Turlock, CA

Dear Editor:

I thoroughly enjoy your magazine and consider it to be the most informative and, pardon the pun, practical wine publication there is. My only wish is that you would publish monthly, 60 days is a long wait, after devouring each issue!

Again, many thanks, and I hope to see you or your staff at the Unified Symposium in January.

Kip Summers, winegrower
Beachaven Vineyards & Winery
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BY RHODA STEWART

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To register, contact Jill Klein, executive director, AAIE, tel: 530-758-8909; e-mail: almond@dcn.davis.ca.us

by Dr. Richard Smart

Do not blow up your irrigation schedule with the pressure bomb!

While visiting California vineyards in August 2001, I encountered much talk of using the "pressure bomb" (also and perhaps more correctly called the pressure chamber) to schedule irrigations. It seems the practice is widespread, but is it always wise? I believe the approach should be used with caution.

There are two basic irrigation decisions to be made in a vineyard: 1) How much water to apply, and 2) When? This edition of *PWV* contains an elegant article on vineyard irrigation by Professor Larry Williams, and I thoroughly endorse his approach of using estimates of evapotranspiration (ET) and "crop factors" to calculate irrigation applications. I also endorse careful soil moisture monitoring, especially at depth, if one is attempting to restrict irrigation to improve quality.

The words "pressure bomb" bring back memories of my early days in viticultural research through the late 1960s and early 1970s. Then I was researching the irrigation of Syrah wine grapes at Griffith, NSW Australia, in a hot dry climate not unlike the Central Valley of California. I may even have published some of the first results of pressure bomb use with grapevines, in 1971, 1972 and 1973 (see papers listed).

The pressure chamber measures water potential, which is expressed in pressure units. Water potentials are, in actuality negative values, but I will use the common approach in what follows and consider them positive.

Water in plant tissues is under negative pressure (suction), caused by water being transpired (evaporated) from the leaves and by the pull on the water column in xylem tissues being transmitted to the roots. Remove a leaf from a vine, and the water column is sucked into the leaf, away from the cut end. If you put the leaf into a pressure chamber, you can "force" the water column back to the cut end of the petiole (leaf stalk). The pressure at which water reappears is equal to the pressure at which it was being "sucked" before you removed the leaf.

I have vivid recollections of long days, starting before dawn and finishing well after sunset, measuring water potential and transpiration rate (with a diffusion porometer). This is necessary to understand how grapevines react to water stress; it is a very dynamic picture.

In the predawn period, water potential is slowly falling. It immediately rises at dawn, as the stomata (little pores) in the leaf open in response to light. The leaves start to transpire, and so pull on the column of water in the vine.

Transpiration is strongly affected by weather; hot, sunny, windy days of low humidity cause the highest transpiration. So during the morning, as temperature and sunshine increase and humidity falls, the transpiration rate goes up, as does leaf water potential.

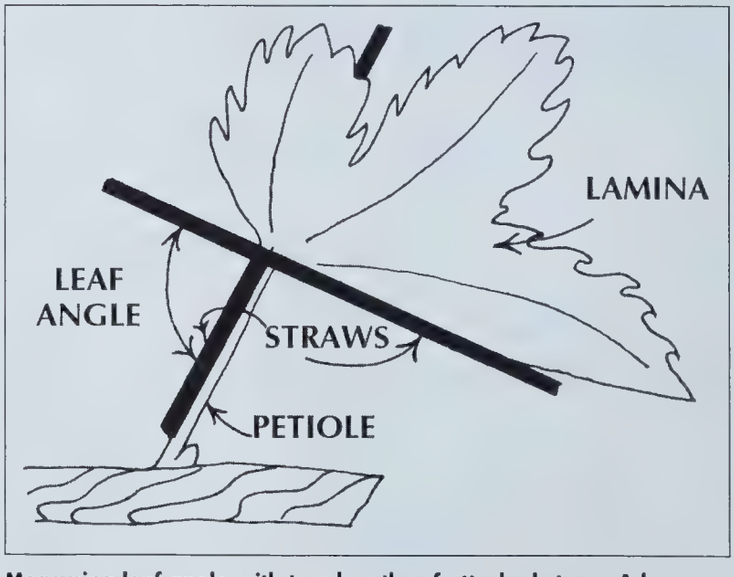
What if the soil is dry? How does the vine respond to the water stress this produces? One of the first responses by the vine is to close stomata around midday if the stress becomes too severe. Our early research in Australia indicated that this happens at around 13 bars (atmospheres) pressure. Once the leaf water potential hits this figure, stomata will begin closure, so further decreases in leaf water potential are checked. The decrease may continue, but not as quickly as if stomatal closure had not occurred.

At the time I was doing irrigation experiments, I wondered whether the pressure bomb might be the best way to schedule irrigation. After all, it is a simple and inexpensive measurement, meaningful in determining the water stress that the vine is actually experiencing.

But I did not persevere with the idea, for two main reasons. First, I considered the pressure bomb readings too sensitive to the current weather, as well as being inherently dynamic, and thus subject to sampling error. Second, for readings greater than about 13 bars, the vines will actually be experiencing more stress than their readings indicate.

Larry Williams's article offers important warnings on the use of the pressure bomb. He suggests readings be made around midday; I found early afternoon to be the best time. Williams also reports a difference of one bar due to daily weather fluctuations; I found much larger differences in Australia. Most of the Californian vineyard regions are unaffected by cloud cover, which is just as well, because cloud cover has a large effect on pressure bomb readings.

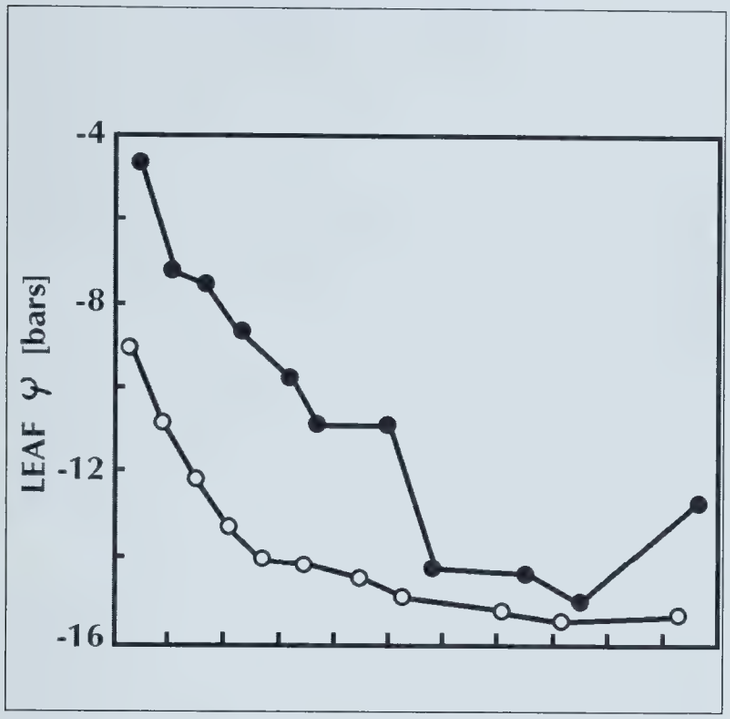
There are other plant-based measurements of water stress as well as leaf water potential. Some researchers claim that stem water potential is a better measure than



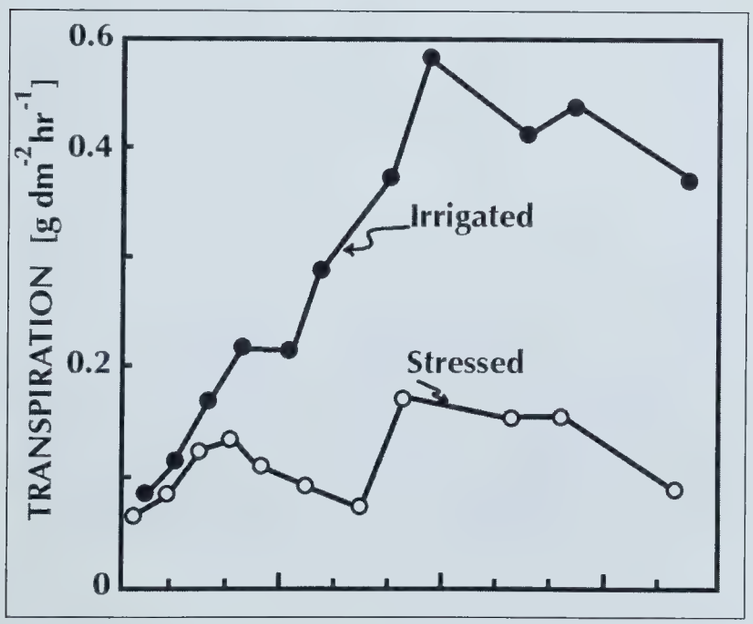
Measuring leaf angle with two lengths of attached straw. A larger angle indicates that the leaves are wilting and drooping, and under water stress.

leaf water potential. Stem water potential is obtained by stopping transpiration from a leaf before measuring the leaf water potential. This is done by putting the leaf in a plastic bag and an aluminium sack one hour before measurement.

French researchers claim this is a better measure of water stress than leaf water potential. Their data include measurement from the Napa Valley. The reference is given below. However, Williams has found that stem water potential and leaf water potential are well correlated anyway.



Patterns of daily leaf water potential and transpiration rate for a hot sunny day for irrigated (black circles) and water-stressed vines. Water potential is plotted as negative values. Note how stomatal closure causes lower transpiration rates and so leaf water potential values are similar in the middle of the day.



There are other measurements of vine water status that do not use the pressure chamber. One can do simple things like attach straws to leaf backs and petioles, and measure leaf angle as the angle between the straws. This is quite well correlated with water stress; as vines suffer stress, leaves droop to reduce sunlight and avoid further stress

One can also measure trunk swelling and shrinkage. Vine trunks shrink during the day, and interestingly, water-stressed vines show less shrinkage than well-watered vines.

I have seen electronic instruments called dendrometers in Spain. These can be connected to a weather station, and measure minute by minute changes in trunk diameter. They are also a potential guide to irrigation; I am sure you will hear more about them in the future.

Perhaps the best measurement of all is the so-called diffusion porometer, which measures whether stomata are open or not. It is a very sensitive guide to water stress. The problem is that instruments are very expensive, but maybe in time and with increased demand, the price could fall.

Growers need not be research scientists, in the business of comparing measurement systems of vine water stress. I am sure that in the next five years or so local scientists will evaluate a range of methods available to growers, and decide which is the best strategy to use.

For those of you using the pressure bomb to schedule irrigation, I would offer the following words of advice. *First,* to avoid sampling error, I would read at least three well-exposed leaves. *Second,* I would make allowance for the weather at the time, specifically sunshine, temperature, humidity, and wind speed. *Third,* I would be cautious about the interpretation of readings showing more than 13 bars, as they can be affected by stomatal closure. ■

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Dr. Richard Smart, "the flying vine-doctor," is an international viticultural consultant based in Australia. He is also the visiting professor of viticulture at Cal Poly, San Luis Obispo, CA. Contact him by e-mail: vinedoctor@compuserve.com. Read about Dr. Smart's business, including his consulting schedule, educational wine tours, and seminars, at his home page http://www.smartvit.com.au. He visits America frequently and his consulting schedule is arranged by Vinquiry in Windsor, CA, tel: 707/838-6312 and http://www.vinquiry.com

by Sue Weeks

Basics of Lab Design

PART ONE

This is the first in a three-part series that discusses the process of designing a new laboratory. Part I will address the basic concepts of laboratory design, and the following two will demonstrate those concepts in practice, using case studies of a small-to-medium and then a large winery operation. The series is meant to serve only as a general guide, since the needs of every laboratory will vary.

Where do I start?

The first step is to determine what analyses will be performed in the laboratory. Think about both present requirements and what you might need in the future. Often, a laboratory outgrows its allocated space within a couple of years of establishment. Financial investment in this contingency now is likely to save considerable costs further down the track.

Also consider the equipment that your analyses will require. Most equipment is becoming more compact, but additional analyses will require more space, not only for the necessary instrument but also for sample preparation. Allow some extra space for this.

Concept design

When you have made the decision regarding analyses, think about the lab's concept. It is sensible to consider the process flow, and thus try to plan the lab so there is a natural progression of samples from receipt to disposal.

Designate areas in your lab

In theory, the sample will move from receipt through several work stations within the laboratory, and then terminate at a wash-up sink or at a disposal area. These potential work stations could be described as sample receipt, sample preparation, wet chemistry, instrumentation, microbiology, administration, sample disposal and wash up, and maybe even tasting area.

Sample receipt

This is likely to be close to the tasting room or bottling line, or to the source of the samples. It should preferably be close to a wet area, too. It should be accessible to other winery staff who might collect samples on the laboratory's behalf. You may also wish to include a work station at this point so that samples can be entered on to your laboratory information management system (LIMS).

Sample preparation

This area should be large enough to include any reagents or equipment that might be used in sample preparation processes of the laboratory. This might include dilution equipment, degassing apparatus, reagents, pipettes, and other glassware.

Wet chemistry

This section of the laboratory is for wet chemistry analyses such as sulphur dioxide analysis, volatile acidity analysis, and alcoholic strength analysis. All necessary apparatus are best placed in close proximity to a sink, as circulating and cooling water disposal is necessary for their operation.

Instrumentation

Electronic instrumentation is best located away from a water source, though it could be isolated yet close to the supply by housing it on an adjacent bench. This would be useful for analyses that require water during the preparation steps, but which do not use water during the actual process. Such instruments might include pH meters, UV/Vis spectrophotometers, and others. Some equipment such as balances are affected by air movement, so take care not to place them near doors, passages, or air conditioning vents. You might also consider a levelled marble top bench for these important laboratory items.

Microbiology

If you are fortunate enough to include microbiological facilities in your plan, you may wish to consider a separate room or at least an alcove to house the facilities. You may also need room for a sterile hood, incubator, autoclave, and centrifuge, all of which take up significant space.

Administration

Allow an area free of laboratory equipment that can be dedicated to administration. This separation prevents important documents from being splashed by both wine and reagents! Allow room for a computer and storage of laboratory catalogues, in addition to filing space. For added comfort, this area can be set at a lower height than normal bench height.

Washing up

This area is best incorporated around a sink outlet not unlike the type found in a domestic kitchen. A dishwasher can be incorporated nearby, and wall-mounted drying racks for sample bottles and glassware should be installed so that the run-off can be channelled directly to waste. Some samples should not be disposed of down the sewage system, and allowances should be made to store this waste material until it can be collected for safe disposal.

Tasting area

If your facility lacks a tasting room, you may need to incorporate one in your lab. (This would be used by the winemaker for tasting and for preparing trial blends.) This area will require good (maybe natural or daylight color-corrected) lighting, light-colored bench tops, and areas for note-taking and glass storage. If possible, set aside an area in your lab for this activity rather than have it occur in the sample preparation area or some other dedicated lab area. Consider the

odors from some laboratory analyses and try to position the tasting area away from these. You may also wish to install a spittoon.

Safety equipment

Safety equipment for the laboratory is a must. Items should include protective coats, glasses, chemical-resistant gloves, and heat-resistant gloves. You will also need to install a first aid kit of the appropriate industry standard, an eye wash, and safety shower. You may also need a spill clean-up kit for chemical spills, a fire extinguisher, and fire blanket. It is advisable to contact your local occupational health and safety representative to ensure regulatory compliance after you have prepared a draft design.

Other equipment

It is easy to overlook the peripheral equipment needs of a laboratory in the design process. That is often why laboratories are cramped from the start. To prevent this, consider the space required for all your other equipment needs such as the vacuum pump, water filtration/processing plant, chemicals, personal items and lab coats, equipment manuals, and general lab records. All these items often take up more space than is allocated — and they tend to build up over a number of years.

Refrigerator

Often a large domestic refrigerator is big enough for a small lab. You will need to allocate space for some refrigerated reagents and enzymes. You will also need a freezer for ice, juice preservation, freeze/thaw cold stability tests, and some reagents such as acetaldehyde.

Lighting

Lighting should be strong (500 lux) but non-reflective such as diffused fluorescence. The tasting area may require specific lighting, and natural light should be incorporated wherever possible.

Floor

The floor should be non-slip pre-finished sheeting, rather than tiles — preferably in lighter, mottled color mixtures. Plain colors are not recommended, as they are more difficult to maintain.

Benches

Benches should be at standing height on fixed metal frames without lower braces. This will allow the use of mobile cupboards and drawer boxes. The front overhang on the benchtop should be six to eight inches and have a rolled finish. The benchtop can incorporate a curving splashback that rises at least eight inches up the adjoining wall. The benchtop should be finished in chemical-resistant covering in a light color. If you choose white, beware of stark blue/white hues that are very glaring and harsh on the eyes. Choose a softer white to prevent glare.

Under-bench cupboards

When planning a new lab, consider mobile drawer units instead of fixed under-bench cupboards. This is a good idea for two reasons. First, it allows flexibility of lab design so that various items of equipment and reagents can be moved about easily and safely. Second, it allows for optional at-bench seating, which is quite difficult when under-bench cupboards are present. Fixed cupboards would usually be incorporated with the sinks. Also consider drawers rather than cupboards, as drawers are more easily accessible at a lower level without crawling about on the floor!

Temperature control

The laboratory should be temperature-controlled so that the temperature remains between 18º to 22ºC (64º to 72ºF). Air movement should be minimized, particularly in the analytical balance area.

Utilities

Install as many power and gas (including nitrogen) outlets as you can during the building process because it is very expensive after the building is complete. You may also wish to consider installing 220-volt or three-phase power to address future needs. Don't forget to include numerous power outlets in the administration area for computers, fax,

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telephone, etc. Make sure they are placed in positions that comply with the local safety regulations.

Water

Sinks and hot and cold water should be readily accessible in most areas of the lab. It is advisable to have at least two lab sinks and a domestic sink even in a small lab environment — more if the lab is larger. When preparing your design, include options for tube attachments at each sink in addition to the regular hot and cold water taps. Also consider taps with winged handles that can be turned on and off with the elbows.

All the above elements contribute to a successful lab design. The most valuable take-home messages are:

1. Take your time and try not to be rushed through the design process. (This can be difficult when you have builders and developers champing at the bit!)
2. Don't make the decisions by yourself. Make it a team project. After all, the people on your team work in the lab and often have the best ideas for how it can be improved. Let them come up with the original design idea, and then take it from there.
3. Try not to skimp on quality. It is better to have good quality basic equipment than many fancy cheap toys that turn out to be a pain in the neck to use or maintain.

Designing a lab and watching it grow into the vision you imagined is a very exciting and challenging process. Doing it right helps assure it will be a rewarding process as well. ■

Next issue: *Lab design case study: How St. Francis Winery met the challenge.*

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Sue Weeks is an Australian wine laboratory consultant. She provides assistance in areas of formal or informal quality system implementation, method validation and troubleshooting, laboratory setup, personnel selection, and staff training. She also facilitates international wine industry training in conjunction with the Communicating for Agricultural Exchange Program (CAEP). She visits America often and can be contacted through the Bibber International website at www.bibber.com.au or tel: 61 8-8563-2422 or fax: 61 8-8563-2433. She can also be contacted through Gordon Burns at ETS Laboratories at tel: 707/963-4806.

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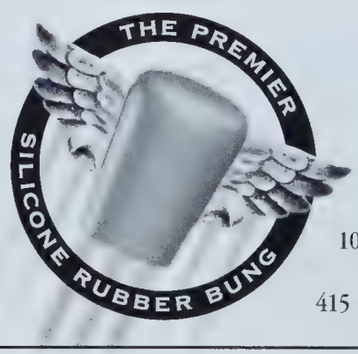

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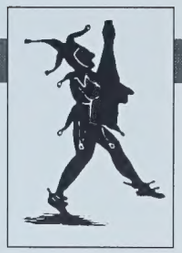

by Jake Lorenzo

Oregon Vacation

Chuy had a hot date, and they were joining us for a week in Oregon. "The play *es la cosa*," Chuy said. His hot date cackled with laughter as if Chuy was the funniest thing since Merlot Rosé. Jakelyn's mom gave me a look that said it was going to be a long week.

We blasted up Highway 5 making Ashland in just under five hours. We roared directly to Omar's for cocktails and to get our clothes smelling of cigarettes. In spite of all the chi chi tourists, and Californians buying up all the prime property, Oregon remains true to itself. Jake Lorenzo doesn't know how long it can last, but he's happy to enjoy it while he can.

The occasional tourists find their way to Omar's, but basically it remains a local place, especially the bar. Most of the locals are drinking versions of boilermakers. That is, they order a shot and a beer. But this being Oregon, the shot is usually single malt; the beer is from a local micro-brewery.

Everyone in the place smokes cigarettes, so your eyes burn, and you develop a phobia about ever seeing the place in the light of day. When you rub the smoke out of your eyes, you can see the local tradesmen, straight from work in their dirty clothes.

Snippets of conversation float past. "Some schmuck bought the old Nelson place for $400,000."

"You gotta be kiddin' me; that place ain't worth half that."

"That's the truth, and it'll take another hundred grand to fix it up."

"Tell you one thing, man, I'd sure like to have that kind of money. If I did, I'd buy me a…"

We decided we'd had enough local color. We paid our bill and stumbled outside gasping for the fresh mountain air. Revived, we went downtown for a terrific dinner in a little place called Amuse. Oregon Pinot Noirs were on the list for $24 to $34, which seemed very reasonable to us. After dinner, the play is the thing. Shakespeare, modern, it doesn't matter, live theater retains a special magic. Of course, Chuy complained that there were no Chicano playwrights featured. I pointed out that Octavio Solis was featured as a guest writer, and creating a play with seven actors.

Chuy was so pleased that he paid for the cocktails at intermission *and* after the play.

We hung around Ashland for three days, eating modestly-priced, delicious meals accompanied by affordable bottles of Oregon wines, and going to the theater. We visited a winery or two, and at one point we had to get a new windshield for my car after a logging truck flipped something up from the highway that turned it into a spider web of cracked glass.

Jakelyn's mom brought it up first. "You know, everyone here is so nice."

"Yeah," Chuy agreed, "and they're competent too. Have you noticed that everywhere we go people know how to serve wine?"

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"Not only do they serve the wine," I pitched in, "they know about the wines and the wineries. Whenever we ask them, they give us good advice."

"I like the shopping," said Chuy's date.

We made our way from Ashland to Eugene. It has to be one of the prettiest three-hour rides in America. Rolling hills loaded with timber forests, rivers raging through small canyons, steep climbs followed by winding descents; it was like a scenic roller coaster ride.

We checked into our hotel, and Chuy went to register. He had decided to become a wine educator, and since the annual convention was in Eugene, so were we. Jakelyn's mom and Jake Lorenzo refused to attend even a single event, not even the free welcome tasting. We were in Oregon on vacation, and that meant finding good places to eat.

For tourists, the right dining experience can pretty much make or break a vacation. In Europe, Jake Lorenzo wanders through towns until he spies the markets. He goes into the best looking butcher shop, and asks which restaurants buy their meat. Then to the best fish shop, and finds which restaurants purchase their fish. Those are my leads, and I follow them, usually to good results.

That doesn't work in America. There are too few fresh fish shops and precious few real butcher shops, most of America preferring to purchase these products in ultra sanitary supermarket packages.

Jake Lorenzo also finds that fine, independent bookstores are a great place to start for restaurant recommendations, especially if the staff is young and moonlighting as waitrons.

Once you pick that first restaurant, cozy up to the bar, have a cocktail, and start a conversation about which is the best Thai restaurant in town. Pretty soon you'll have a consensus.

We ended up at the Ring of Fire in Eugene. Our waiter was terrific. He knew about the obscure Bogle Petite Sirah on the list for a mere $18. He recommended a delightful Willakenzie Pinot Noir for $28, and when we finished with a rare Madiron from France, he marveled at the tannin when we gave him a glass.

He not only gave us restaurant recommendations, he wrote down the addresses and gave us directions. We used it as our bible, and were not disappointed. Chuy was, however. After a day and a half of wine education, Chuy retired. "Those peoples got no sense of humor. They're too serious all the time. I mean, it's only wine, right Jake?"

"Right you are amigo. What do you say we go out and get a beer?"

"I'm with you carnal, and tell me a joke on the way. I need a laugh."

So Chuy, Jake Lorenzo, and Jakelyn's mom take off for an 11 AM beer. As we're leaving the hotel, Jakelyn's mom asks Chuy, "Where's the little woman?"

"She's worn out from shopping, so she's pampering herself with a pedicure."

Jake Lorenzo and Jakelyn's mom stop cold. We stare at Chuy. Chuy stares back at us blankly. Then he starts to grin. Then he bursts out laughing so hard that a tear squeezes from one eye.

"This beats the hell out of wine education," laughs Chuy. "Let's get that beer, and then I want a really good three-bottle lunch." ■

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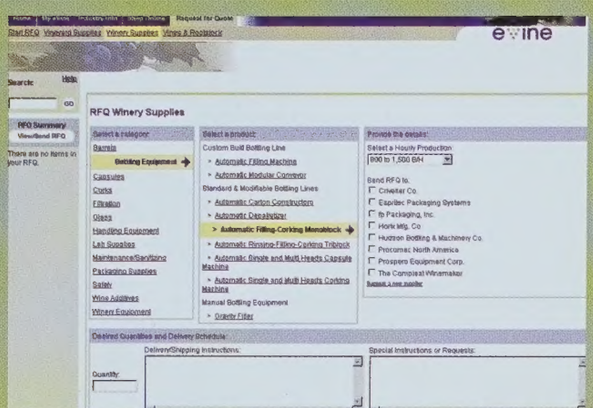

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